

GEOLOGICAL  
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PAPER 61-29

UPPER DEVONIAN FORMATIONS,  
SOUTHERN PART OF NORTHWEST TERRITORIES,  
NORTHEASTERN BRITISH COLUMBIA,  
AND NORTHWESTERN ALBERTA

(Report and 4 figures)

Helen R. Belyea and D. J. McLaren



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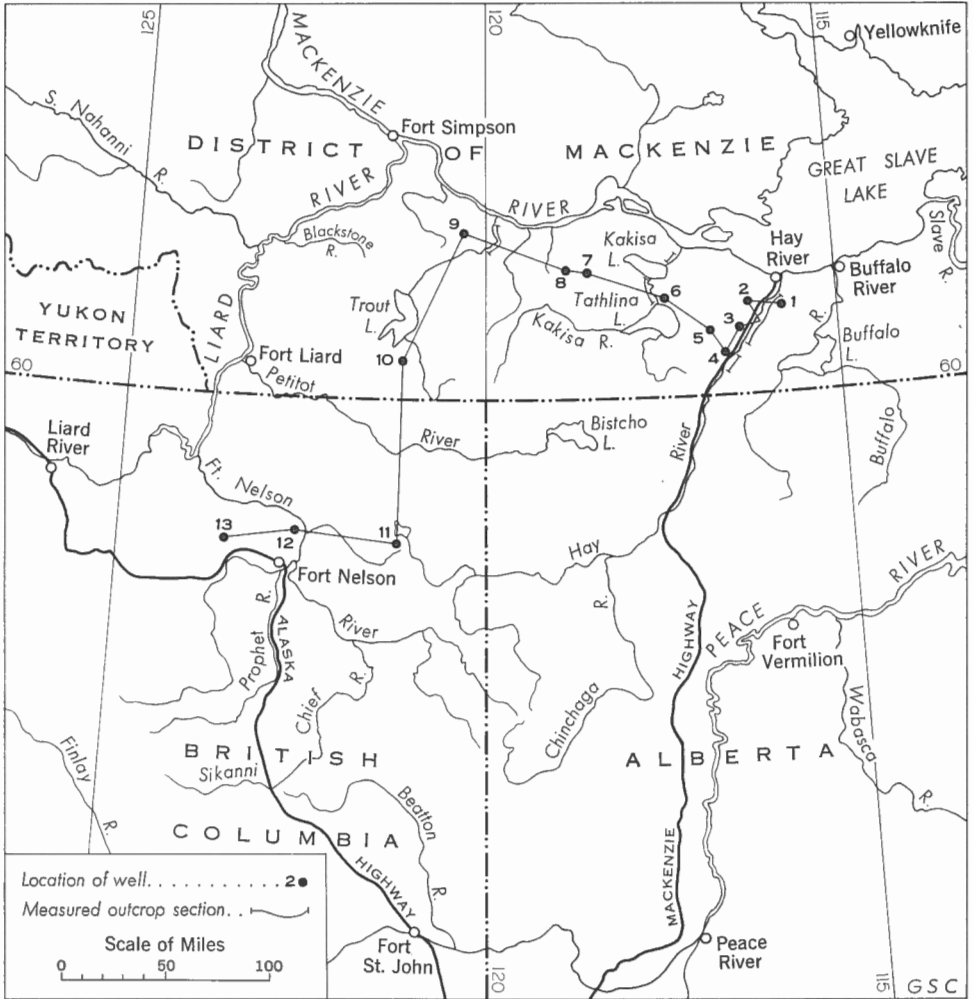


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SERIES	STAGE	NORTHEASTERN BRITISH COLUMBIA	TROUT RIVER AREA	KAKISA AND TATHLINA LAKES AREA	HAY RIVER AREA
		Overlying beds	Mississippian	Cretaceous	Cretaceous
UPPER DEVONIAN	FAMENNIAN	Kotcho Fm.	Tetcho Fm.	Trout River Fm.	Trout River Fm.
		Tetcho Fm.			
		Trout River Fm.	Kakisa Fm.	Kakisa Fm.	Redknife Fm.
		Kakisa Fm.	Upper Member Jean-Marie Member	Upper Member Jean-Marie Member	
FRASNIAN	Underlying beds	Fort Simpson Fm.	Fort Simpson Fm.	Fort Simpson Fm.	Tathlina Fm.
		Fort Simpson Fm.	Fort Simpson Fm.	Fort Simpson Fm.	Tathlina Fm.
		Fort Simpson Fm.	Fort Simpson Fm.	Fort Simpson Fm.	Twin Falls Fm.
					Tathlina Fm.
					Upper Member Falls Fm.
					Alexandra Member
					Escarpment Member
					Lower Member
					Middle Devonian

GSC

Figure 2. Formational terminology

UPPER DEVONIAN FORMATIONS, SOUTHERN PART OF  
NORTHWEST TERRITORIES, NORTHEASTERN BRITISH  
COLUMBIA, AND NORTHWESTERN ALBERTA

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INTRODUCTION

Upper Devonian rocks outcrop in a narrow belt south of Great Slave Lake and the upper Mackenzie River, extending from Buffalo Lake in the east to Blackstone River in the west. Sections showing parts of the succession are exposed in valleys of streams flowing north into the Mackenzie, notably Hay, Kakisa, and Trout Rivers. Southwards the Devonian is buried below Cretaceous rocks and is only known from bore-holes.

Great Slave Lake and Mackenzie River lie on the main route of exploration to the north and northwest, and geological exploration of the upper Mackenzie region began more than a century ago. Observations on the geology of Hay River were made by McConnell (1891)<sup>1</sup> and Cameron (1917). The first formation names in the area were proposed by Cameron (1918), who recognized these three units in the Upper Devonian: Hay River Limestones, Hay River Shales, and Simpson Shales.

Whittaker (1922, 1923) extended the use of these terms along the streams that drain northward into the Mackenzie, west of Hay River—namely Kakisa, Bouvier, Redknife, and Trout Rivers and Jean-Marie Creek—and attempted correlation between them. No further formations were proposed until Crickmay (1953, 1957) limited the Hay River Formation essentially to the upper part of Cameron's Hay River Shales, and proposed these two new formations—the Alexandra below, and the Grumbler above—as equivalent to the Hay River Limestone of Cameron. Bassett gave a detailed and accurate description of the Hay River section in an unpublished manuscript (published abstract, 1956). Law (1955) discussed the correlation of the subsurface Upper Devonian in northern Alberta, but employed either existing names or informal lithologic units.

In 1957 the Geological Survey of Canada made detailed observations on the outcrops in the region, adding information from wells; a preliminary map was published (Douglas, 1959) in which, for the most part, informal map-units were employed.

The present paper is the result of a study of all available surface and subsurface information to date, both lithological and faunal,

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<sup>1</sup>Dates in parentheses are those of publications listed in the References.

in the area from Hay River west to the Liard and south to the latitude of Peace River arch. Earlier formational names are considered and modified where necessary; new names are proposed for units mappable in outcrop or in subsurface within the region. Facies changes, especially wedging out of limestone bodies to the west, make a multiple formational scheme necessary. The terminology proposed is shown in Figure 2. New stratigraphic names proposed are: Twin Falls Formation, Tathlina Formation, Redknife Formation with the Jean-Marie Member, Kakisa Formation, Fort Simpson Shale, Tetcho Formation, and Kotcho Formation.

Outcrop section, and wells referred to in the text, are summarily described in the Appendix. The same sections and wells are illustrated in Figures 3 and 4, with suggested correlations between them indicated, and the electrical logs of the wells plotted. The locations of the sections and wells are shown on an index map (Figure 1).

Acknowledgment is made to the British Columbia Department of Mines and Petroleum Resources and to the various companies for help and cooperation during examination of cores. Permission was kindly granted by Murphy Canada Limited to publish data on the Upper Devonian of Murphy Canada Alexandra Falls Nos. 1 and 2 wells before the release date of these wells. Well names and locations are as given in the "Schedule of Wells Drilled for Oil and Natural Gas in British Columbia (1906 to 1959)", and the "Schedule of Wells in the Northwest Territories and Yukon Territory (1920 to 1960)".

## HAY RIVER FORMATION

Cameron (1918) described two formations on Hay River: the Hay River Limestone above, and the Hay River Shale below. The boundary between the two formations was drawn at the base of Louise Falls on Hay River. Crickmay (1953) restricted the name 'Hay River Formation' to the 530 feet of beds between the lowest shell bed, 13 miles from the river mouth, and the topmost shale bed below Louise Falls. In 1957 Crickmay redefined the top of the formation upward as far as the 6 feet of siltstone and sandstone at the base of Alexandra Falls, thus making the Hay River Formation 630 feet thick.

The top of the Hay River Formation, as here defined, is the same as Crickmay's 1957 definition, i.e. at the base of Alexandra Falls. The formation comprises all beds exposed in outcrop on Hay River from this horizon downwards, in addition to the shales penetrated in Frobisher Hay River No. 4 well, down to the Middle Devonian limestone. Hay River remains the type section of the formation, with the addition of the above-mentioned well. The thickness of beds exposed on Hay River is 759 feet; an additional 539 feet was penetrated in Frobisher Hay River No. 4 well. This well is located very close to the lowest outcrop on Hay River. The total thickness of the formation is, therefore, approximately 1,300 feet at the type section. The Hay River Formation is map-unit 15 in Douglas (1959), but the lowest outcrop mapped on Lower Kakisa River is now considered part of the Twin Falls Formation.

Two members are recognized. The upper—here named the Escarpment Member, with type section on Hay River—is 364 feet thick. It consists of olive-grey calcareous mudstones and thin-bedded argillaceous limestones with strongly bioclastic, biohermal, and biostromal limestone bodies irregularly developed throughout. The most prominent of these bioclastic-biohermal limestone bodies forms Louise Falls; there, it is about 16 feet thick. This unit thickens downstream from the falls for about a mile and then thins. To the northwest the unit thickens to a massive coralliferous and bioclastic limestone, well exposed along the Fort Providence road and near Heart Lake (map-unit 15b—Douglas, 1959). A coral-stromatoporoid limestone unit some 150 feet below the top of the member is exposed in Hay River gorge. The same unit thickens northwestward and forms the low escarpment to the east of Escarpment Lake (map-unit 15a—Douglas, 1959).

The Escarpment Member is overlain by the Twin Falls Formation and underlain by the lower member of the Hay River Formation. The basal unit of the Escarpment Member, consisting of a prominent 4-foot, greenish grey, argillaceous limestone containing very abundant corals and brachiopods, is known informally as the "Schizophoria bed" and is the lowest coral-bearing horizon on Hay River.

The informally-designated lower member of the Hay River Formation is 399 feet thick in outcrop, with a further 539 feet developed in Frobisher Hay River No. 4 well. It consists of greenish grey mudstones and shales, variably calcareous, with widely scattered thin beds of argillaceous limestone. It rests on brown medium-grained limestones assigned to the Slave Point Formation of Middle Devonian age.

The Hay River Formation is recognizable in all wells drilled in the area of Hay River westwards as far as Briggs Tathlina Lake No. 3 well. The members cannot be easily recognized westwards from Murphy Canada Alexandra Falls No. 1 well. Westwards from Kakisa River the Hay River Formation loses its identity in the Fort Simpson Formation (defined elsewhere in this report).

The fauna of the lower member in outcrop on Hay River consists principally of brachiopods, and may be typified by Monelasmina besti Pedder, Cyrtospirifer kennicotti (Meek), and Eleutherokomma reidfordi Crickmay. Occurring near the base of the member in Frobisher Hay River No. 4 well, are fragments of brachiopods typical of the Firebag Member of the Waterways Formation. The member may be correlated with the Waterways, the Beaverhill Lake, and the Cooking Lake Formations. It is of early Upper Devonian (Frasnian) age.

The Escarpment Member contains abundant corals and brachiopods, including Macgeea proteus Smith, species of Pachyphyllum, Tabulophyllum mcconnelli (Whiteaves), Calvinaria variabilis (Whiteaves), and Cyrtospirifer thalattodoxa Crickmay. It may be correlated with the Duvernay Formation and lower part of the Ireton. The horizon of the boundary between the Cairn and Southesk Formations of the Alberta Rocky Mountains occurs within the member, which is of mid-Frasnian age.

## GRUMBLER GROUP

Crickmay (1953, 1957) defined the Grumbler Formation with type section on Hay River, for all Devonian beds exposed upstream from Alexandra Falls. He described (1957) a supplementary section on Trout River, which included all beds between his Trout River Formation (described below) and the limestones that outcrop at Table Rock Rapids. He placed the lowest beds—those on Trout River at Table Rock Rapids—in the Alexandra Formation, defined by him on Hay River. Mapping by the Geological Survey in 1957 and further drilling since then in the Hay River - Trout River region has allowed more detailed correlation between the outcrop sections on the two rivers. It is now known that the lowest outcrop on Trout River lies some 350 feet stratigraphically higher than the highest outcrop on Hay River. The usage of the term 'Grumbler Formation' therefore becomes highly ambiguous. Because it has been widely used, however, it seems desirable to retain it as a group name. The Grumbler Group thus contains all strata of early Upper Devonian (Frasnian) age lying above the Hay River Formation, and comprises four formations: the Twin Falls Formation at the base, consisting largely of limestones with some shales; the Tathlina Formation, predominantly calcareous siltstones, shales, and sandy limestones; the Redknife Formation, siltstones and shales with limestone member at base; and the Kakisa Formation, silty limestones with coral-stromatoporoid biostromes and bioherms. The Alexandra Formation of Crickmay (1953, 1957) is a local facies occurring at the base of the Twin Falls Formation as here defined, on Hay River; hence it is included in the Grumbler Group.

The term 'Grumbler Group' is particularly useful in northern Alberta east of the 117th meridian and north of the 57th parallel. Recent drilling in that area has encountered a sequence of carbonates and siltstones continuous with the Grumbler Group, but in it the subdivisions made in the Edmonton and Hay River areas are not easily recognized.

### Twin Falls Formation

The formation is defined with type section on Hay River. The outcrop extends from a point 1 mile upstream from Grumbler Rapid down to the top of the Hay River Formation at the base of Alexandra Falls. A supplementary section is named in Murphy Canada Alexandra Falls No. 2 well. This section, illustrated in Figure 3, shows the electrical log characteristics typical of the formation in the Northwest Territories and northern Alberta.

The formation has an estimated thickness of 521 feet on Hay River and 435 feet in the above-named well. Two members are recognized: an informally-designated upper member, 420 feet thick, consisting of variably bioclastic, reefoid, and biostromal limestone with some quartzose sand and silt, and some more shaly horizons; and a lower or Alexandra Member that corresponds with Crickmay's (1957) Alexandra Formation, but excludes the upper 36 feet of his definition. The Alexandra Member is 101 feet thick in outcrop. Below the upper 70 feet of the formation on Hay River there is a covered interval of about 150 feet which in Murphy Canada Alexandra Falls No. 2 well is of

similar lithology to the remainder. Small and medium-sized coral-stromatoporoid bioherms are developed at several horizons within the formation, the highest being the resistant unit which forms Grumbler Rapid.

On Hay River the Alexandra Member corresponds approximately with map-unit 17 in Douglas (1959). The upper member is equivalent to his map-units 18, 19, and part of 20. On Kakisa River the formation corresponds to Douglas' map-units 17 and 18, together with the highest part of map-unit 15.

The Twin Falls Formation is overlain by the Tathlina Formation, and the contact is drawn where the coralliferous and bioclastic limestones of the Twin Falls give way to strongly quartzose, sandy, and argillaceous limestones at the base of the Tathlina Formation. The Twin Falls is underlain by the Hay River Formation as defined above.

As mapped in the subsurface, the Twin Falls Formation has an arcuate trend from Kakisa River north of Tathlina Lake to Hay River near the point where it crosses from the Northwest Territories into Alberta. Thence it extends in a general south-to-southeasterly direction to become part of the Grosmont Formation in the Red Earth area. Accurate correlation with the Grosmont is not certain, owing to truncation by pre-Cretaceous erosion, sparse well-control, and changes to dolomite and to silty and sandy limestone and dolomite. In wells in the Foetus and Rabbit Lakes area and to the west, the formation loses its identity in the Fort Simpson Shale. Wells in Northern Alberta and in the Hay River area show an increase in limestone content towards the east, and in siltstone and sandstone farther east and southeast. There is a transition zone of intertonguing limestones, silty and argillaceous limestones and shales with electrical log characteristics similar to those of the more typical Twin Falls. This transition zone extends southward into northern Alberta along the western edge of the Grosmont carbonate complex.

The fauna of the formation consists mainly of corals and brachiopods. The lower beds below the covered interval on Hay River are characterized by Hexagonaria bompasi (Smith), species of Pachyphyllum, Atrypa canadensis Webster, and Indospirifer sp. The upper beds contain Hexagonaria reticulata (Smith), Mictrophyllum modicum Smith, Phacellophyllum tructense McLaren, Atrypa ciliipes Crickmay, and species of Theodossia. The formation may be correlated with part of the Ireton Formation of the Alberta subsurface, and with the lower part of the Southesk of the Alberta Rocky Mountains. It is of mid-Frasnian age.

#### Tathlina Formation

The Tathlina Formation is defined in the subsurface in Briggs Tathlina Lake No. 3 well, between 340 and 780 feet. It consists of grey calcareous siltstones, and silty and sandy mudstones with fine-grained silty limestones, variably bioclastic. The highest

64 feet of the Devonian rocks exposed on Hay River, about 2 1/2 to 4 miles upstream from Grumbler Rapid (upper part of map-unit 20—Douglas, 1959), are the basal beds of this formation. They consist of quartzose sandy, bioclastic limestone interbedded with silty argillaceous limestone. The formation is truncated in the Hay River area by an erosion surface and in the type well by the Redknife Formation. The contact is picked below a prominent limestone bed which, to the west, develops into the Jean-Marie Member of the Redknife Formation. The Tathlina is underlain by the Twin Falls Formation. The Tathlina presumably underlies much of the covered interval under Kakisa Lake (map-unit 19—Douglas, 1959), but westwards loses its identity in the Fort Simpson Formation. Eastward it thins and, in northern Alberta, where not truncated by erosion, it may be seen to change to silty limestone with minor interbedded siltstone similar to the overlying Redknife Formation. The lower 100 feet forms a prominent carbonate unit continuous with the Twin Falls Formation and correlative with the upper part of the Grosmont. The middle part of the formation thins eastward and southward. The upper 150 feet consists of limestone and interbedded siltstone.

No fossils have been recovered from the subsurface, but some are contained in the basal beds, exposed on Hay River. The fauna consists mainly of brachiopods; there are no corals. It includes a species of Nervostrophia, Devonoproductus, and Tenticospirifer. The formation can only be correlated by its stratigraphic position, and is presumably equivalent to a horizon within the Ireton or Nisku, and within the Southesk Formation. It is of Frasnian age.

#### Redknife Formation

The type section of the Redknife Formation is on Trout River and comprises all beds between the cliff-forming Kakisa Formation down to and including the lowest outcrop at Table Rock Rapids. Because much of the section is covered, a supplementary section is named from Briggs Turkey Lake No. 1 well, between 490 and 780 feet. On Trout River, 231 feet is developed. The formation is divided into two members. The upper, informally designated, consists of greenish grey and maroon calcareous mudstones and shales, with thin interbeds of argillaceous and sandy limestones, and calcareous quartzose sandstones. The lower member—here named the 'Jean-Marie Member'—consists of variably argillaceous, silty, and dolomitic limestone, with abundant fossil fragments. The upper member is 220 feet thick on Trout River and 260 feet thick in Briggs Turkey Lake No. 1 well. Only 11 feet of the Jean-Marie Member is exposed on Trout River. The unit is variable in thickness; 30 feet is present in Briggs Turkey Lake No. 1 well, and more than 50 feet occurs in wells to the south.

The upper member is soft weathering, but partial outcrops occur on Bouvier and Redknife Rivers below the scarp-forming Kakisa Formation, and on Trout River. Eastward and southward the shales pinch out and the member thins to a sequence of limestones and siltstones; southward, in the vicinity of the Peace River arch, the limestones change to dolomites. The lower member

is more resistant and is well exposed in Jean-Marie Creek, 12 miles downstream from Deep Lake. In the subsurface the Jean-Marie Member is one of the most easily recognized horizons in the Trout River area and it continues southward into northeastern British Columbia and northwestern Alberta. To the southeast it is difficult to separate from limestone tongues of the upper part of the Tathlina Formation. Westwards in British Columbia it thickens locally (170 feet in Pacific Utahn No. b-83-C well in 94-L-13/b-83-C), then pinches out into shale at about the 122nd meridian. The formation corresponds approximately to map-unit 20 (Douglas, 1959) westward from middle Kakisa River. It is not exposed to the east of Kakisa River.

The Redknife Formation is overlain in outcrop by the more resistant silty limestones of the Kakisa Formation. The boundary is drawn at an obvious lithological change. In the Kakisa River area the Redknife is underlain by the Tathlina Formation, but westwards from Foetus Lake it rests on the Fort Simpson. In Imperial Island River No. 1 well, the Kakisa Formation is not present and the Redknife is overlain by the Trout River Formation. Farther southwest and west, for example in (Gulf States) Evie Lake No. 1 well, the formation loses identity in a continuous shale sequence.

The upper member is poorly fossiliferous with scattered ostracods and small brachiopods. The lower member has yielded an abundant coral-brachiopod fauna from Trout River and Jean-Marie Creek, including Phacellophyllum tructense McLaren, "Hexagonaria cf. magna (Fenton and Fenton)" of Smith 1945, Theodossia sp., Grunewaldtia sp., and Cyrtospirifer sp. A similar fauna has been recovered from this member in Imperial Island River No. 1 well between 5,136 and 5,164 feet. The age of the formation is late Frasnian and may be correlated with part of the Winterburn Group and the upper part of the Southesk Formation.

#### Kakisa Formation

The type section of the Kakisa Formation is on Trout River, from just above the highest falls (Coral Falls) to the lowest exposure of massive limestones in the canyon below the main falls (Whittaker Falls) on Trout River. The type section is 187 feet thick. A supplementary section is named in Briggs Turkey Lake No. 1 well between 310 and 490 feet. The formation consists of yellowish grey and olive-grey, quartzose, silty, dolomitic limestones, with argillaceous partings. Prominent bioclastic or reefoid biostromes and bioherms, composed largely of corals and stromatoporoids, may occur at any horizon within the formation. At the type section the upper 70 feet of the formation is reefoid, and forms a unit of very variable thickness. The formation corresponds to map-unit 21 of Douglas (1959).

The Kakisa Formation first outcrops in the east on middle Kakisa River; it continues westward as a scarp-forming unit, paralleling Mackenzie River, and then swings west and southwestward to Blackstone River in the western part of the area. Virtually complete sections of the formation are exposed in the north-flowing streams that

drain into the Mackenzie—e.g. Bouvier, Redknife, Trout, and Jean-Marie Rivers—and in the rivers flowing westward into the Liard—e.g. the Poplar, Birch, and Blackstone. Reefoid beds occur about the middle of the formation on middle Kakisa River, and two reefs occur on the scarp to the south of the western end of Kakisa Lake. Reef development appears to be at a maximum in the Foetus and Rabbit Lakes area. Southwestward from Briggs Turkey Lake No. 1 well the formation becomes increasingly shaly, and thins. It can be recognized as a thin limestone tongue in most wells in northeastern British Columbia as far west as the 123rd meridian. Southward, it maintains a thickness of about 100 feet until it approaches the Peace River arch. In the vicinity of the arch it becomes increasingly dolomitic, thins, and loses its identity as a separate unit. South of the arch in central Alberta it probably tongues into the Graminia Formation. Locally it is missing, probably as a result of pre-Trout River erosion.

The Kakisa Formation is overlain by the Trout River Formation; the boundary commonly corresponds with a sharp change in lithology from silty or coralliferous limestones below to calcareous sandstones of the Trout River Formation above. It rests on the Redknife Formation as previously defined. The Kakisa is the highest formation in the Grumbler Group.

Fossils are not common in the silty argillaceous limestone facies of the Kakisa Formation. The commonest are the small solitary coral "Metriophyllum sp. A" of Smith 1945, and Atrypa ciliipes Crickmay. The coral-stromatoporoid reef facies, however, carries a rich fauna, typified by Hexagonaria caurus (Smith), Pachyphyllum exiguum (Lambe), Phacellophyllum tructense McLaren, Hypothyridina sp., Theodosia scopulorum (Crickmay), and Scutellum sp. The age of the formation is latest Frasnian, and it may be correlated with the Arcs Member of the Southesk Formation. The faunal break between the Kakisa and the overlying Trout River Formation is one of the most important in the Palaeozoic.

#### FORT SIMPSON SHALE

Cameron (1918) named the Simpson Shale for 150 feet of soft greenish grey clay shales that occur on Mackenzie River near Simpson. He considered that these shales represented a horizon stratigraphically below the outcropping Hay River Shales which he described in the same report. Crickmay (1957), and others have considered that the Simpson Shale of Cameron underlies the Hay River Shale of at least most of the outcrop on Hay River. However, the fauna described from the type locality of the Simpson Shale (Kindle, 1919) makes it clear that this cannot be so. Kindle's species Cyrtina glabra is very probably conspecific with Thomasaria rockymontana (Warren) from high in the Perdrix and low in the Mount Hawk Formations of the Alberta Rockies. Buchiola, Ontaria, and species of Entomis, closely similar to those described by Kindle, occur high in the Perdrix Formation. The outcrop section of Cameron's Simpson Shale may therefore be correlated with reasonable certainty with the lower part of the Escarpment Member of the upper part of the lower member of the Hay River Formation as here defined. As the term

'Simpson Formation' is preoccupied, the formation was renamed 'Fort Simpson' by Douglas and Norris (1961). It is here referred to a type section in Briggs Turkey Lake No. 1 well.

The Fort Simpson Formation occurs in the type well between 780 and 2,720 feet. It consists of greenish grey to grey mudstones and shales, variably calcareous and quartzose silty. It occurs in limited outcrop in the lower part of Jean-Marie Creek some 9 miles due south of its mouth on Mackenzie River. West of Kakisa River the Fort Simpson Formation, as thus defined, includes the stratigraphic interval occupied by the Hay River, Twin Falls, and Tathlina Formations, as developed in the Hay River area. The formation corresponds to the Simpson Formation of Douglas (1959), i. e. his map-unit 16. It is present in all wells from Briggs Foetus Lake No. 1 well westward to Briggs Turkey Lake No. 1 well, and south to Gulf States Kotcho Lake d-39-J well. West of this well the unit is lost in a largely-unbroken shale sequence. The upper boundary of the formation is drawn at the base of the Jean-Marie Member of the Redknife Formation. In the type well the lower boundary is drawn at the top of the predominantly dark brownish grey to black shales of the Middle Devonian Horn River Formation. Eastward, the lower boundary is drawn at the top of Middle Devonian limestone units.

To the south and west it may be necessary to extend usage of the term upward in the succession to include beds here assigned to an unnamed Shale Unit (Figure 4 and Appendix), thus including possible stratigraphic equivalents of the Redknife and Kakisa Formations.

To the south, in northern Alberta, the Fort Simpson Formation is the "shale unit" of Law (1955). It is presumably the equivalent of the Beaverhill Lake Formation and Woodbend Group. The term can therefore be used in Alberta in areas where the Beaverhill Lake Formation cannot be recognized. The Fort Simpson Formation thus embraces all the Frasnian stage excepting the Redknife and Kakisa Formations.

#### TROUT RIVER FORMATION

Crickmay (1953, 1957) defined the Trout River Formation with type section on Trout River, as the 174 feet of silty limestones and calcareous siltstones at the top of the continuous outcrop on the river. It is here restricted to the 130 feet of quartzose sandy limestones and calcareous sandstones that occur above the Kakisa Formation on Trout River. It is overlain by the Tetcho Formation, the boundary being drawn at the change from pure limestones or silty limestones of the overlying formation to quartzose sandy limestones of the Trout River. The formation corresponds to the lower part of map-unit 22 (Douglas, 1959).

Parts of the Trout River Formation outcrop sporadically in the vicinity of Foetus and Rabbit Lakes, on Redknife River, and around the shores of Deep Lake, overlying the Kakisa Formation. It is highly irregular in thickness, and appears to have been deposited

over an uneven surface on the Kakisa Formation. It is present in all wells from Briggs Turkey Lake No. 1 southwestward to (Gulf States) Evie Lake No. 1.

In Alberta there is a marked regional thinning of the sandy unit eastward from the British Columbia boundary and southward towards the Peace River arch. This thinning may be due to facies change from siltstones in the west to limestones similar to those of the Wabamun Group in the east. Hence, in most wells east of the 118th meridian the formation consists of a sandstone or pebble bed less than 10 feet thick. Locally it thickens, presumably filling an irregular surface on the underlying formations just as it does in outcrop.

The Trout River Formation contains a sparse fauna of brachiopods which includes species of "Camarotoechia", Cyrtiopsis, and Athyris. It may be correlated with part of the Alexo Formation of the Alberta Rocky Mountains, and is of early Famennian age.

#### TETCHO FORMATION

The Tetcho Formation is defined in Imperial Island River No. 1 well between 4,165 and 4,415 feet. It consists of buff to cream, fine-grained limestone with shale partings, and becomes increasingly silty downwards in the unit. On Trout River, 120 feet of the lower part of the Tetcho Formation outcrops from the beginning of the continuous exposure on the river—4.8 miles at a bearing of 211° from the main falls (Whittaker Falls)—down to the beginning of the Trout River Formation. A further outcrop occurs on Trout River upstream for about 1 1/2 miles—11 miles at a bearing of between 232° and 238° from Whittaker Falls. The upper part of map-unit 22 (Douglas, 1959) corresponds to part of the Tetcho Formation.

The upper boundary is drawn at the lithological change to the predominantly shaly Kotcho Formation. The Tetcho is present in all wells south to (Gulf States) Evie Lake No. 1, although reduced in thickness. Southwards it is mappable directly through wells in northern Alberta into the lower part of the Wabamun Group.

The fauna from outcrop on Trout River consists of brachiopods, which include species of Productella, Basilicorhynchus basilicum (Crickmay), Cyrtiopsis sp., and Athyris sp. The formation may be correlated with the lower part of the Wabamun Group and the lower Palliser Formation in the Alberta Rocky Mountains. It is of early Famennian age.

#### KOTCHO FORMATION

The Kotcho Formation, named from Kotcho Lake, British Columbia, is described from a type section in Imperial Island River No. 1 well from 3,473 to 4,165 feet, with a thickness of 692 feet. It consists of light greenish grey to brownish grey shales, non-calcareous to slightly calcareous, with lenses and nodules of fine-grained argillaceous limestone. Beds of purer bioclastic limestone occur. Within the area under consideration the formation is known only

in the subsurface, and is present in all wells south to (Gulf States) Evie Lake No. 1. It thins southward and southwestward away from the type well. Eastward, along a line close to the Alberta - British Columbia border, it changes to limestone and cannot be discriminated from the Wabamun Group.

The Kotcho Formation is overlain by black shales and dark brown argillaceous limestones of Mississippian or late Devonian age, which may be equivalent to the Exshaw Formation of Alberta. It overlies the Tetcho Formation, with a transitional boundary in most wells.

Between 3,789 and 3,809 feet in Imperial Island River No. 1 well, specimens of "Leiorhynchus" cf. "L. seversoni" (McLaren) were obtained from a core. Brachiopod fragments occur at several horizons within the formation. The Kotcho Formation is equivalent to the upper part of the Wabamun Group of the Alberta subsurface, and to the upper part of the Palliser Formation of the Alberta Rocky Mountains. It is of mid-Famennian age.

#### REFERENCES

- Bassett, H.G.  
1956: Correlation of Devonian Sections in Northern Alberta and Northwest Territories; (abs.) Dissert. Abs., vol. 16, No. 5, p. 943.
- Cameron, A.E.  
1917: Reconnaissance on Great Slave Lake, Northwest Territories; Geol. Surv., Canada, Sum. Rept. 1916, pp. 66-75.  
1918: Explorations in the Vicinity of Great Slave Lake; Geol. Surv., Canada, Sum. Rept. 1917, pt. C, pp. 21-27.
- Crickmay, C.H.  
1953: New Spiriferidae from the Devonian of Western Canada; Published by the author and printed by Imperial Oil Ltd., Calgary, Alta., 11 pp.  
1957: Elucidation of Some Western Canada Devonian Formations; Imperial Oil Ltd., private publication.
- Douglas, R.J.W.  
1959: Great Slave and Trout River Map-areas, Northwest Territories; Geol. Surv., Canada, Paper 58-11.
- Douglas, R.J.W., and Norris, D.K.  
1961: Camsell Bend and Root River Map-areas, District of Mackenzie; Geol. Surv., Canada, Paper 61-13.
- Kindle, E.M.  
1919: The Discovery of a Portage Fauna in the Mackenzie River Valley; Geol. Surv., Canada, Mus. Bull. 29.

- Law, J.  
1955: Geology of Northwestern Alberta and Adjacent Areas; Bull. Am. Assoc. Petrol. Geol., vol. 39, No. 10, pp. 1927-1975.
- McConnell, R.G.  
1891: Report on an Exploration in the Yukon and Mackenzie Basins, Northwest Territories; Geol. Surv., Canada, Ann. Rept. 1888-89, vol. 4, pt. D, p. 163.
- Smith, S.  
1945: Upper Devonian Corals of the Mackenzie River Region, Canada; Geol. Soc. Amer., Spec. Paper 59, 126 pp.
- Whittaker, E.J.  
1922: Mackenzie River District Between Great Slave Lake and Simpson; Geol. Surv., Canada, Sum. Rept. 1921, pt. B, pp. 45-55.
- 1923: Mackenzie River District Between Providence and Simpson; Geol. Surv., Canada, Sum. Rept. 1922, pt. B, pp. 88-100.

— APPENDIX —

OUTCROP SECTIONS

Hay River (above covered interval)

Location: Section measured from right bank of Hay River, 3.8 miles at a bearing of 215° from Grumbler Rapid (the highest exposure of Devonian rocks on Hay River); downstream to left bank of Hay River 3.9 miles at a bearing of 24° from Grumbler Rapid (the lowest exposure above the long covered interval).

Summary section compiled from detailed individual outcrop sections described by D.J. McLaren. Totals are cumulative from base of outcrop on Hay River.

Lithology	Thickness (feet)	
	Unit	Total
<u>Tathlina Formation</u>		
Limestone, bioclastic, quartzose sandy, pale yellowish brown, medium- and coarse-grained; interbedded with limestone, argillaceous, quartzose silty or fine sand; thin- and medium-bedded; alternating hard- and soft-weathering; fossiliferous.....	63.4	1,343.8
Thickness of Tathlina Formation exposed.....	63.4	
<u>Twin Falls Formation</u>		
Limestone, strongly coralliferous and bioclastic, variably dolomitic and quartzose sandy; olive-grey to pale yellowish brown, coarse- to very-coarse-grained; medium-bedded; very abundant corals, and stromatoporoids .....	14.8	1,280.4
Limestone, argillaceous, silty, variably bioclastic, light grey to pale red; thin-bedded; grading downwards into yellowish grey, cryptograined limestone; unbedded; flecked with calcite spaths....	56	1,265.6
Thickness of Twin Falls Formation exposed.....	70.8	
Covered interval assigned to Twin Falls Formation..	150	1,209.6

Hay River (below covered interval)

Location: Section measured from left bank of Hay River, 9.3 miles at a bearing of 198° from Alexandra Falls to lowest outcrop on Hay River at left bank, 12.3 miles at a bearing of 207° from mouth of Hay River; between mile 11 and mile 12 on highway.

Summary section compiled from detailed individual outcrop sections described by P. Harker, D.K. Norris, D.F. Stott and D.J. McLaren. Totals are cumulative from base of outcrop on Hay River.

Lithology	Thickness (feet)	
	Unit	Total
<u>Twin Falls Formation (cont.)</u>		
Upper Member		
Limestone, grumulous, yellowish grey, cryptograind to fine fragmental; mainly thick-bedded; some stromatoporoids and coral fragments .....	42.7	1,059.6
Limestone, largely composed of stromatoporoids; forms biohermal mound.....	5.2	1,016.9
Limestone, dolomitic, reefoid, light olive-grey; massive; composed largely of corals andstromatoporoids; forms prominent bioherm, 100 feet long, on left bank of Hay River .....	31.0	1,011.7
Covered interval.....	13.0	980.7
Mudstone, calcareous, silty, pale red, fine-grained; nodular; soft-weathering.....	27.6	967.7
Limestone, bioclastic, argillaceous, silty, pale red to greyish red and flecked with light greenish grey; thin-bedded, rubbly; interbedded with calcareous mudstone; abundantly fossiliferous with corals and brachiopods .....	30.8	940.1
Limestone, variably dolomitic, light olive to brownish grey, fine- and medium-grained; thin- and medium-bedded; variably bioclastic; upper beds of unit are strongly coralliferous, lower beds are coarsely mottled on weathered surfaces; brachiopods scattered throughout .....	48.9	909.3
Thickness of Upper Member .....	420.0	

Lithology	Thickness (feet)	
	Unit	Total
<u>Alexandra Member</u>		
Limestone, light grey to yellowish grey, fine- and medium-grained; medium-bedded to massive, laminated on cliff face; some partings of greenish grey mudstone and thin bands of quartzose sandstone; top of unit forms lip of Alexandra Falls.....	24.4	860.4
Limestone, pinkish grey, fine-grained; massive; with argillaceous partings; <u>Amphipora</u> scattered throughout unit.....	44.1	836.0
Limestone, grey to greyish orange, dolomitic; biohermal with irregular masses of stromatoporoids and corals; becomes quartzose sandy near base.....	10.4	791.9
Limestone, quartzose silty, yellowish grey, medium-grained; massive; some argillaceous partings and scattered pyrite grains.....	22.6	781.5
Thickness of Alexandra Member.....	101.5	
Total thickness of Twin Falls Formation.....	521.5	

Hay River Formation

Escarpment Member

Sandstone, calcareous, light olive-grey, medium-grained; massive, current-bedded.....	11.4	758.9
Covered interval.....	22.0	747.5
Limestone, brown, fine- to medium-grained; bioclastic with coral fragments, downstream becomes increasingly reefoid, largely composed of tabulate and rugose corals; this unit forms Louise Falls.....	16.4	725.5
Limestone, bioclastic, variably argillaceous, pale brown, fine-grained; strongly thin- and medium-bedded.....	33.1	709.1
Limestone, strongly argillaceous, and mudstone strongly calcareous; irregularly interbedded.....	8.8	676.0

Lithology	Thickness (feet)	
	Unit	Total
Sandstone, argillaceous, calcareous, yellowish grey; medium-bedded; thin interbeds of argillaceous sandstone; unit very variable in thickness, maximum development in vicinity of junction of Mills Lake Road with Mackenzie Highway.....	22.0	667.2
Mudstone, calcareous, pale olive-grey; largely talus-covered; scattered corals .....	37.2	645.2
Limestone, pale yellowish brown, fine-grained; very abundant coral fragments and stromatoporoids; forms resistant unit "the sandwich beds"; variable in thickness; shows signs of reefing along strike .....	13.8	608.0
Covered interval; probably entirely light olive-grey mudstone .....	120.7	594.2
Mudstone, calcareous, olive-grey; with nodular layers of argillaceous limestone; forms prominent marker unit along river banks; fauna of corals and brachiopods .....	11.0	473.5
Mudstone, calcareous, light olive; variably fissile and blocky; partly covered.....	63.7	462.5
Limestone, argillaceous, greenish grey, medium-grained; massive; very abundant corals and brachiopods; "the <u>Schizophoria</u> bed" .....	4.0	398.8
Thickness of Escarpment Member .....	364.1	
Lower Member		
Mudstone, greenish grey; scattered calcareous nodules; a few thin beds of argillaceous limestone with shell fragments.....	95.0	394.8
Mudstone, olive-grey to olive-green; largely non-calcareous but some thin beds of calcareous mudstone; a few thin beds of coarse-grained limestone largely composed of brachiopods; no fossils occur below this unit .....	127.3	299.8
Mudstone, olive-grey to dark greenish grey; partly fissile; some covered intervals; a few thin beds of argillaceous limestone .....	172.5	172.5

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Lithology	Thickness (feet)	
	Unit	Total
Thickness of Lower Member .....		398.8
Total thickness of Hay River Formation .....		758.9
End of exposure on Hay River at 12.3 miles at a bearing of 207° from mouth of Hay River; between mile 11 and mile 12 on highway.		

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Middle Kakisa River

Location: Section measured from right bank of middle Kakisa River, 0.7 mile at a bearing of 335° from outlet of river from Tathlina Lake; downstream to left bank of middle Kakisa River, 0.8 mile at a bearing of 207° from mouth of river on Kakisa Lake.

Summary section compiled from detailed individual outcrop sections described by D.J. McLaren. Totals are cumulative from base of outcrop on middle Kakisa River.

Lithology	Thickness (feet)	
	Unit	Total
<u>Trout River Formation</u>		
Sandstone, calcareous, pale orange, medium-grained; and limestone, clastic, greyish orange to pale orange, medium- and coarse-grained; scattered brachiopods .....	11.0	215.6
Covered interval .....	15.0	204.6
Limestone, clastic and pelletoid, partly quartzose sandy, and sandstone, calcareous, with clastic limestone fragments, greyish orange to pinkish grey; regularly medium-bedded, lithologies alternate along strike as well as vertically; unit partly covered .....	23.0	189.6
Sandstone, quartzose, calcareous, yellowish grey, and limestone strongly sandy and bioclastic; brachiopods common .....	11.0	166.6
Thickness of Trout River Formation exposed .....	60.0	
<u>Kakisa Formation</u>		
Limestone, quartzose sandy, bioclastic, yellowish grey to olive-grey, medium- to coarse-grained; some thin beds of calcareous sandstone; vaguely medium- to thick-bedded; abundant rolled coral and stromatoporoid fragments in pelletoid matrix; some unbroken corals .....	27.7	155.6
Limestone, reefoid, largely composed of stromatoporoids and corals; massive .....	10.0	127.9
Largely covered interval, with minor outcrop of calcareous light brown sandstone .....	25.1	117.9

Lithology	Thickness (feet)	
	Unit	Total
Limestone, bioclastic, pale brown to pale orange, very-coarse-grained; massive to poorly thick-bedded; rock composed of stromatoporoid, coral, and crinoid debris, and cryptograined matrix; unit variable in thickness and detailed lithology along strike.....	20.6	92.8
Limestone, reefoid, stromatoporoidal, yellowish grey to pinkish grey, matrix cryptograined; massive; stromatoporoids make up 30 to 50% of rock; brachiopods occur in pockets .....	17.3	72.2
Thickness of Kakisa Formation exposed.....	100.7	
Covered interval; the boundary between Kakisa and Redknife Formations occurs within this interval.....	45.0	54.9
<u>Redknife Formation</u>		
Sandstone, strongly calcareous, argillaceous, yellowish grey to light greenish grey, fine- to medium-grained; thin-bedded; some recessive-weathering; more-argillaceous horizons.....	9.9	9.9

Lower Kakisa River

Location: Section measured from right bank of lower Kakisa River, 2.5 miles at a bearing of 55° from outlet of river from Kakisa Lake; downstream to left bank of lower Kakisa River 6.1 miles at a bearing of 55° from outlet of river from Kakisa Lake, just below Kakisa Crossing.

Summary section compiled from detailed individual outcrop sections described by D.J. McLaren. Totals are cumulative from base of outcrop on Lower Kakisa River.

Lithology	Thickness (feet)	
	Unit	Total
<u>Twin Falls Formation</u>		
Limestone, fragmental, light olive to light brownish grey, medium-grained; medium-bedded; abundant brachiopod fragments .....	3.0	257.1
Covered interval.....	16.0	254.1
Limestone, argillaceous and variably bioclastic, olive-grey, medium-grained; thin- and medium-bedded; abundant corals and brachiopods .....	14.7	238.1
Mudstone, calcareous, quartzose silty or fine sandy, light grey to yellowish grey; irregularly nodular; partly covered .....	17.2	223.4
Limestone, argillaceous, variably dolomitic, light olive-grey, medium-grained; thin- and medium-bedded; scattered brachiopods.....	18.9	206.2
Limestone, argillaceous, light grey to pale olive-grey, medium-grained; thin- and medium-bedded; interbedded with calcareous mudstone that increases downwards in unit; scattered corals and brachiopods; lip of Lady Evelyn Falls occurs near top of this unit..	47.4	187.3
Covered interval.....	20.0	139.9
Partial outcrop of: limestone, bioclastic, olive-grey, coarse-grained; in large lumps; probably interbedded with calcareous shale; large amounts of mud and clay in weathered matrix with reefoid lumps of stromatopoids and corals; increasingly covered downwards..	68.0	119.9

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Lithology	Thickness (feet)	
	Unit	Total
Mudstone, calcareous, light olive-grey to yellowish grey; weathered to clayey rubble, with some more calcareous beds showing thin- and medium-bedding in poor outcrop near middle of the unit; well-preserved brachiopod fauna; largely covered towards base .....	20.0	51.9
Limestone, argillaceous, light grey to pinkish grey, fine- to medium-grained; rubbly weathering; thick-bedded; partings of calcareous mudstone; irregular mottled weathered surface; a few brachiopods .....	31.9	31.9
Thickness of Twin Falls Formation exposed .....	257.1	

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Trout River

Location: Section measured from top of continuous exposure on Trout River on right bank, 4.8 miles at a bearing of 211° from Whittaker Falls (i.e. the main falls, 47 feet high), downstream to Table Rock Rapids.

Summary section compiled from detailed individual outcrop sections described by D.J. McLaren. Totals are cumulative from base of outcrop.

Lithology	Thickness (feet)	
	Unit	Total
<u>Tetcho Formation</u>		
Limestone, granular, pelletoid or fragmental, pinkish to yellowish grey, partly cryptogained; medium-bedded; scattered brachiopods .....	54.1	667.9
Limestone, variably silty or quartzose sandy and dolomitic, yellowish grey, medium-grained; medium-bedded; some pisolitic bands and limestone pebble beds; scattered pyrite.....	25.1	613.8
Limestone, silty or fine sandy, yellowish grey, fine-grained; some argillaceous beds and thin argillaceous partings between beds; variably bioclastic and pebbly or pisolitic; scattered brachiopods .....	40.8	588.7
Thickness of Tetcho Formation exposed.....	120.0	
<u>Trout River Formation</u>		
Limestone, quartzose sandy, yellowish grey, medium-grained; and sandstone, quartzose, strongly calcareous; mudstone partings common; regularly medium-bedded.....	48.9	547.9
Limestone, strongly quartzose sandy, argillaceous, yellowish grey; and sandstone, calcareous, argillaceous; with some interbeds of calcareous quartzose sandy mudstone; sandstone increases downwards in unit alternating with sandy limestones and some mudstone; thin- and medium-bedded .....	81.5	499.0
Total Thickness of Trout River Formation.....	130.4	

Lithology	Thickness (feet)	
	Unit	Total
<u>Kakisa Formation</u>		
Limestone, fragmental, stromatoporoidal, and tuffaceous, pale yellowish brown to light olive-grey; lower half of unit with abundant fibrous calcite tufa and calcite-filled cavities; this part of unit forms the upper falls (Coral Falls) on Trout River; within this unit is Whittaker's (1922, p. 53B) "submarine unconformity" .....	39.0	417.5
Limestone, bioclastic, and fragmental, quartzose silty and sandy, variably argillaceous, yellowish grey; abundant corals throughout, with small biohermal masses; bed of quartzose sandstone near middle of unit; lower part of unit forms cliff 200 yards above second falls.....	36.4	378.5
Limestone, silty, dolomitic, yellowish grey to light olive-grey, fine-grained; thin bedding draping over small regular bioherms of single colonies of compound corals; base of unit forms lip of second falls (Whittaker Falls).....	13.9	342.1
Limestone, argillaceous, quartzose silty, yellowish grey, fine- and medium-grained; thin-bedded; scattered corals and brachiopods .....	62.6	328.2
Limestone, variably fragmental, quartzose silty or sandy, argillaceous, yellowish grey; thick-bedded, weathering thin; grading downwards into calcareous quartzose sandstone interbedded with greenish grey sandy limestone; mudstone partings between beds ...	34.8	265.6
Total thickness of Kakisa Formation .....	186.7	
<u>Redknife Formation</u>		
Upper Member		
Covered interval; near outcrop of dark greenish grey mudstone and calcareous sandstone .....	90.0	230.8
Covered interval.....	60.0	140.8
Mudstone, calcareous, dark greenish grey; with thin interbeds of argillaceous and sandy limestone and argillaceous calcareous quartzose sandstone; scattered brachiopods in hard bands.....	39.8	80.8

Lithology	Thickness (feet)	
	Unit	Total
Covered interval.....	30.0	41.0
Thickness of Upper Member .....	219.8	
Jean-Marie Member		
Limestone, variably argillaceous and silty, dolomitic, bioclastic, light olive-grey to pale yellowish brown; thick-bedded, weathering thin; abundant corals and brachiopods .....	11.0	11.0
Thickness of Jean-Marie Member exposed.....	11.0	
Total thickness of Redknife Formation exposed.....	230.8	

LOG OF WELLS

1. Frobisher Hay River No. 4 Well

Location: Lat. 60°42'N, Long. 115°52'W.  
Elevation: 587 feet  
Completed: 1946 Total depth: 639 feet  
Result: Abandoned

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

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Depth (feet)	Lithology
36	<u>Hay River Formation</u> <sup>1</sup>
36 - 53	Core broken and crushed; Shale, light greenish grey, calcareous.
53 - 115	Shale, light greenish grey, calcareous, fissile.
115 - 132	Shale, grey, non-calcareous, fissile, small brown specks, probably carbonaceous.
132 - 245	Shale, light greenish grey, fissile, slightly calcareous; a few small ostracods, crinoid discs, brachiopods, spines; pyritized carbonaceous laths, probably of plant origin.
245 - 258	Core broken; Shale, same as above.
258 - 288	Shale, same as above; slightly calcareous, varying to non-calcareous.
288 - 289	Shale, as above; scattered layers of grey shaly limestone, less than 1/2 inch thick.
289 - 329	Shale, same as above; a few thin grey shaly limestone nodules and layers scattered through section; grey-coated limestone nodules, possibly pebbles, at 313 feet.
329 - 331	Shale, as above; interbedded with lenses and nodules of grey argillaceous limestones up to 1 inch thick.

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<sup>1</sup> Depths of formation contacts are given from mechanical log characteristics where ambiguity exists between these and samples; sample descriptions are adjusted accordingly.

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Depth (feet)	Lithology
331 - 384	Shale, greenish grey, slightly calcareous, as above.
384 - 405	Shale, as above, and limestone, grey, argillaceous, fine-grained, occurring as irregular nodules and lenses in shale; scattered fossil fragments; brachiopods, crinoids, small gastropods.
405 - 417	Shale, greenish grey, calcareous; a few nodules and layers of grey argillaceous limestone; a few brachiopods.
417 - 514	Shale, grey, slightly calcareous, fissile; varies from slightly brownish grey to slightly greenish grey; a few <u>Lingula</u> ; slightly pyritic.
514 - 520	Shale, light greyish brown, slightly calcareous, fissile, a few pyrite nodules; varies to greenish grey; bottom 2 inches is dark brown with abundant <u>Tentaculites</u> (?).
520 - 528	Shale, greenish grey, grading down to brownish grey, slightly calcareous; <u>Lingula</u> ; thin layers of limestone with brachiopods at 528 feet.
529 - 538 1/2	Shale, greenish grey, slightly calcareous; a few <u>Lingula</u> and pelecypods.
538 1/2 - 539	Shale, grey, calcareous, massive; abundant pyrite.
539	<u>Slave Point Formation</u>
539 - 539 1/2	Limestone, brown, medium- to coarse-grained; brachiopods, a few stromatoporoid fragments; much pyrite.
539 - 547	Limestone, brown, very-coarse-grained, consisting of stromatoporoids and coarse crinoid debris; a few brachiopods; wavy brown shale laminae.

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2. Northwest Territories Escarpment Lake No. 1 Well

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

Elevation: 888 feet ground, 896 feet K.B.

Completed: 1954

Total depth: 2,085 feet

Result: Suspended

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

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Depth (feet)	Lithology
0 - 30	Drift
	<u>Hay River Formation</u>
30	Escarpment Member
30 - 50	Limestone and dolomite, composed of corals, stromatoporoids, algae; matrix is dolomite, light brown, fine- to medium-crystalline.
50 - 60	Limestone and dolomite, as above; limestone buff, fine-grained, silty, pyritic; limestone, brown, argillaceous, grading to shale, brown with carbonaceous fragments; scattered crinoids.
60 - 100	Limestone, buff to light brown, silty, argillaceous; carbonaceous specks; brown silty shale, probably occurring as laminae; scattered coral fragments, crinoids, brachiopods, ostracods.
100 - 130	Shale, grey, calcareous; siltstone, grey, calcareous, pyritic, grades to limestone, grey, argillaceous, dense; shell fragments, spines; grey, hard, tightly cemented siltstone.
130 - 160	Limestone, buff, fine-grained matrix, in part dolomitic, medium-crystalline; contains stromatoporoids, corals; some grains show pelletoid structure with calcite cement; limestone, light brown, silty, argillaceous; shale partings, carbonaceous specks.
160 - 210	Shale, grey, greenish grey; limestone, grey, argillaceous; scattered dark grains and shell fragments; buff limestone with corals and stromatoporoids as above; limestone composed largely of brachiopods, crinoids and shell debris, many fragments worn and darkened; pyrite common.

Depth (feet)	Lithology
210 - 260	Shale, grey, greenish grey, reddish grey; siltstone, grey, micaceous; much limestone, probably from above.
260 - 290	Siltstone, light grey, calcareous, micaceous, slightly porous; small fossil fragments; shale, greenish grey; siltstone varies to silty fossiliferous limestone.
290 - 320	Siltstone as above, argillaceous, less porous; varies to shale; scattered shell fragments, in part made up of limestone.
320 - 340	Shale, grey, greenish grey, calcareous, chunky; varies to grey, dense, argillaceous limestone.
340 - 350	Limestone, grey to buff, dense, slightly argillaceous in part; varies to shale.
350 (electric log)	Lower Member
350 - 600	Shale, light greyish green, calcareous; siltstone, grey, argillaceous, probably as laminae; scattered ostracods, crinoids, small brachiopod fragments.
610 - 800	Samples largely drift, presumably shale and siltstone as above.
800 - 890	Shale, greyish green, slightly micaceous, varying to reddish grey, splintery; becomes more greyish and brownish grey downwards.
890 - 950	Shale as above; much calcareous siltstone, as above.
950 - 1,120	Shale, grey to greenish grey and brownish red, splintery; samples poor.
1,120 - 1,130	Shale; some fragments of limestone, grey, argillaceous, fine-grained.
1,130 - 1,150	Shale, grey to reddish grey.
1,150 - 1,170	Shale, as above, and abundant large pyrite crystals.
1,170 - 1,220	Limestone, grey, fine-grained matrix; abundant scattered broken fossil fragments; brachiopods, crinoids, bryozoa; in part limestone is slightly argillaceous; green mineral, may be glauconite.
1,220 - 1,290	Shale, greenish grey to brownish grey and reddish grey.

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Depth (feet)	Lithology
1,290 - 1,310	Limestone, brown, with abundant fossil fragments; argillaceous, varies to dark brown bituminous shale; abundant spines.
1,310	<u>Slave Point Formation</u>
1,310 - 1,330	Limestone, brown; fragments showing cell structure, probably stromatoporoids; grey shale.
1,330	Limestone, grey and buff, fine- to medium-grained, slightly argillaceous, speckled; brachiopods.

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3. Union Alexandra Falls Test No. 1 Well

Location: Lat. 60° 27' 15" N, Long. 116° 21' W.

Elevation: 902 feet ground, 906 feet K.B.

Completed: 1955 Total depth: 1,722 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 (feet)	Lithology
0 - 20	Drift.
20	<u>Twin Falls Formation</u>
	Upper Member
20 - 70	Limestone, grey to pink and purple, mottled, fossiliferous; coarse fragments of brachiopods, corals; some cream aphanitic brittle limestone; some limestone, grey, coarse-grained, dolomitic, fossiliferous, (calcarenite); shale, pinkish grey to greenish grey.
70 - 80	Limestone, grey, argillaceous; scattered carbonaceous specks.
80	Alexandra Member
80 - 90	Limestone, grey, fine-grained, vague structures, possibly crystallized organic structures.
90 - 170	Limestone, light grey, aphanitic, scattered vugs lined with calcite, a little pyrite toward base.
170 - 200	Limestone, buff, fine- to medium-grained matrix, dolomitic; abundant stromatoporoid or algal structures.
200	<u>Hay River Formation</u>
	Escarpment Member
200 - 230	Siltstone and sandstone, light grey, fine-grained, calcareous, micaceous, grains angular and well-sorted, fair porosity, scattered pyrite, slightly dolomitic in part.
230 - 250	Siltstone, grey, argillaceous, calcareous, extremely pyritic; shale, grey, fissile, probably partings.

Depth (feet)	Lithology
250 - 270	Limestone, buff, fine- to coarse-grained matrix; abundant coral and stromatoporoid material; limestone is dolomitic and becomes buff, medium-crystalline dolomite at 260 - 270 feet; red stain; shale, grey, brown and red.
270 - 280	Shale, grey, calcareous, finely micaceous, chunky fragments.
280 - 350	Limestone, light yellow-brown, very-fine-grained, slightly argillaceous; grades to shaly limestone and shale; a little siltstone at 290-300 feet; brachiopod and crinoid fragments; carbonaceous specks.
350 - 360	Limestone, buff, grey, fine- to coarse-grained matrix, slightly silty; abundant large fossil fragments include corals, brachiopods, crinoids, bryozoa, stromatoporoids.
360 - 380	Shale, greenish grey; siltstone, grey, calcareous; limestone, as above, with abundant fossil fragments.
380 - 390	Siltstone, grey, argillaceous, micaceous, calcareous; shale, greenish grey.
390 - 410	Shale, grey to greenish grey, trace of red; limestone, light brown, fine-grained; cell structure suggesting stromatoporoids; brachiopods.
410 - 460	Shale, grey, scattered fossil fragments, in part may make up limy layers; siltstone, grey, argillaceous, micaceous.
460 - 480	Siltstone, grey, calcareous, varies to silty limestone; dark fragments; brachiopods, <u>Tentaculites</u> ; pyrite.
480 - 510	Siltstone, grey, calcareous, micaceous, almost very-fine-grained sandstone.
510 - 520	Limestone, cream, aphanitic; abundant stromatoporoid and coral fragments; limestone in part pelletoid.
520 - 540	Shale, grey, silty, calcareous, pyritic; a few <u>Tentaculites</u> .
540 - 560	Limestone, grey, composed of fossil fragments, bryozoa, crinoids, <u>Tentaculites</u> ; shale, grey, as above.
560	Lower Member
560 - 600	Shale, grey, silty, splintery; siltstone and silty limestone with brachiopods, crinoids.

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Depth (feet)	Lithology
600 - 800	Shale, grey, greenish grey, splintery, some reddish brown; a little siltstone, probably as thin laminae.
800 - 1,150	Shale, greenish grey to grey; some zones with abundant calcareous siltstone, grey, micaceous, pyritic; carbonaceous specks common; scattered limy layers and crinoid fragments.
1,150 - 1,310	Shale, grey, to greenish grey and brownish grey; carbonaceous specks.
1,310 - 1,320	Shale as above; limestone, grey, argillaceous, fine-grained, tight.
1,320 - 1,380	Shale, greenish grey.
1,380 - 1,430	Limestone, grey, fine-grained; scattered coarse fossil fragments; in part composed almost entirely of coarse fossil fragments, crinoids, brachiopods.
1,430 - 1,500	Shale, greenish grey, calcareous.
1,500 - 1,510	Limestone, brown, fine-grained, argillaceous; shale, dark brown, with brown streaks, calcareous; brachiopod fragments.
1,510	<u>Slave Point Formation</u>
1,510	Limestone, buff to grey, fine- to coarse-grained, speckled; abundant shell fragments; brachiopods; chert.

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4. Murphy Canada Alexandra Falls No. 2 Well

Location: Lat. 60°15'30.8"N, Long. 116°34'41.96"W.

Elevation: 952 feet ground, 962.55 feet K.B.

Completed: 1960

Total depth: 2,800 feet

Result: Abandoned

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

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Depth (feet)	Lithology
0 - 32	Drift.
32 - 50	No samples.
50	<u>Tathlina Formation</u>
50 - 90	Limestone, light yellow-brown, fine-grained matrix with scattered coarse fossil fragments, silty, argillaceous; much red stain; shale, grey to maroon; brachiopods, crinoids, abundant corals.
90	<u>Twin Falls Formation</u>
	Upper Member
90 - 130	Limestone, white, fine- to coarse-grained matrix containing abundant corals and stromatoporoids; calcite cement; upper 10 feet with much pelletoid limestone and green waxy shale; vugs lined with calcite.
130 - 140	Limestone, as above, and fine-grained, argillaceous, silty limestone; much fossil debris, ostracods; carbonaceous specks.
140 - 150	Limestone, as above; scattered stromatoporoid and brachiopod fragments; grey and maroon shale and siltstone.
150 - 170	Limestone, light yellow-brown, fine- to coarse-grained (calcarenite), pelletoid; calcite cement; much shell debris, brachiopods, crinoids, corals, spines.
170 - 200	Limestone, medium- to coarse-grained, calcarenite, in part pelletoid; a few stromatoporoid fragments; calcite cement; maroon shale partings at top.

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Depth (feet)	Lithology
200 - 240	Limestone, fine- to coarse-grained, in part pelletoid; much fine fossil debris; scattered coral and possible stromatoporoid fragments; brownish grey shale laminae; calcite cement.
240 - 260	Samples missing.
260 - 290	Limestone, grey, fine-grained, slightly argillaceous, (calcilutite); brown shale laminae, carbonaceous specks; crinoid and brachiopod fragments.
290 - 330	Limestone, buff, fine- to coarse-grained, pelletoid, much stromatoporoid and/or algal material; some limestone with brown shale intermixed; grey shale, probably as partings or laminae; pink stain at base.
330 - 410	Limestone, shaly, grey, varies to shale; limestones, grey, dense; abundant brachiopods, crinoids, scattered carbonaceous specks; probably consists of interbedded shales, limy shales and limestones.
410 - 435	Limestone, as above, slightly argillaceous; black stained pellets or pebbles and fossil fragments.
435	Alexandra Member
435 - 500	Limestone, grey-buff, fine-grained, calcilutite, slightly argillaceous; shaly laminae, in part slightly silty; scattered brachiopods.
500 - 525	Limestone, buff, fine-grained, mottled with silty buff argillaceous dolomite; shale partings.
525	<u>Hay River Formation</u>
	Escarpment Member
525 - 610	Shale, grey to greenish grey, calcareous, silty; grey, argillaceous, dense limestone, in part containing abundant fossils; scattered pyrite; scattered carbonaceous specks; brachiopod and coral fragments; Charophyte (?) at 580 - 590 feet; abundant pyrite cubes and argillaceous limestone and coarse crinoid fragments at 600-610 feet.
610 - 630	Limestone, buff, with abundant stromatoporoid fragments, fine-grained matrix; brown carbonaceous specks; scattered brachiopods.

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Depth (feet)	Lithology
630 - 640	Some limestone, as above, with coral fragments and stromatoporoids; siltstone, light green, quartzose, calcareous, micaceous.
640 - 670	Siltstone, light greenish grey, quartzose, calcareous, micaceous green shale partings; varies to very-fine-grained micaceous sandstone, with scattered green minerals; fair intergranular porosity; limestone, buff, very-fine-grained; scattered brachiopod and crinoid fragments.
670 - 720	Siltstone; as above but with more green argillaceous material; breaks into platy fragments.
720 - 760	Siltstone, as above; shale, greenish grey, flaky; fragments suggest platy laminae.
760 - 770	Shale, as above; some coarse fossiliferous limestone; scattered spines.
770 - 780	Limestone, buff and grey, fine-grained, (calcilutite), silty; brachiopods, crinoid fragments.
780 - 820	Siltstone, light grey to greenish grey, very-fine-grained, argillaceous; in part coarser and porous; interbedded (?) silty limestones; dark grey inclusions; fragments of corals, may be cavings.
820 - 840	Shale, grey-green, silty; silty limestone and siltstone, as above; bryozoa and other fossil fragments; a few dark grey-stained pebbles.
840 - 900	Siltstone, grey-green, buff, calcareous, pyritic; limestone, grey, silty, containing scattered fossil fragments, argillaceous; some coarse-grained pebble limestone (calcarenite), containing abundant shell fragments.
900 - 930	Siltstone, fine-grained, pyritic; greenish grey shale.
930	Lower Member
930-	Shale, grey-green, silty.

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5. Murphy Canada Alexandra Falls No. 1 Well

Location: Lat. 60° 28' 26.68"N, Long. 116° 51' 33.84"W.

Elevation: 975 feet ground, 985.5 feet K.B.

Completed: 1960 Total depth: 3,137 feet

Result: Abandoned

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

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Depth (feet)	Lithology
0	<u>Tathlina Formation</u>
0 - 30	Limestone, light grey, fine-grained, argillaceous, silty (calcilutite); grey shale laminae, mica flakes; scattered brachiopod and crinoid fragments; pyrite associated with organisms; scattered dark grey-coated pebbles and pyrite at 20-30 feet.
30 - 50	Limestone, buff, fine-grained, (calcilutite); scattered fossil fragments, in part silicified; siliceous spicules; some greenish grey calcareous shale.
50 - 80	Shale, grey and brownish grey, with carbonaceous specks, calcareous, silty; grades to silty limestone; scattered brachiopod fragments.
80 - 100	Limestone, buff, fine-grained, fossiliferous; scattered coarse fossil fragments and dark grey-stained pebbles; some green silty shale.
100 - 160	Shale and limestone, greyish brown, highly silty, varies from more- to less-limy; abundant scattered brachiopod fragments.
160 - 170	Shale, silty, calcareous as above; some dark brown shale with brown streak.
170 - 180	Shale and silty limestone, more limy than above.
180 - 190	Shale, greenish grey, silty; silty limestone layers.
190 - 230	Limestone, buff, fine-grained, silty; scattered brachiopods and crinoids; grey inclusions at 190-200 feet; shale, greyish brown, silty.

Depth (feet)	Lithology
230 - 280	Siltstone, grey, calcareous, micaceous; green mineral, possibly glauconite; grey-green shale interlaminated.
280 - 300	Limestone, buff, fine-grained, comminuted shell debris; a little grey sandstone with black grains; brown shale laminae; crinoids and brachiopods.
300 - 330	Limestone, as above; siltstone, greyish green, argillaceous; green mineral (glauconite?); scattered shell fragments.
330	<u>Twin Falls Formation</u>
	Upper Member
330 - 380	Limestone, buff, fine- to medium-grained, (calcarenite); scattered corals, brachiopod and crinoid fragments; siltstone, greyish green; shale, grey-green, calcareous, scattered pyrite; dark grey-stained pebbles at 360-370 feet.
380 - 400	Siltstone, grey, calcareous, grades to limestone; crinoid and brachiopod fragments; some green shale.
400 - 440	Limestone and siltstone; limestone, grey and buff, fine- to medium-grained, (calcarenite); scattered corals, brachiopods and crinoids; silty, grades to siltstone, grey, argillaceous; grey and dark grey shale laminae; shaly material intermixed with siltstone and limestone.
440 - 450	Limestone, buff, fine- to medium-grained, silty; brachiopods, crinoids; green shaly siltstone with small dark-stained pebbles.
450 - 510	Limestone, buff, fine- to medium-grained, (calcarenite); brown shale laminae; some grey limestone with comminuted fossil debris; abundant brachiopod and crinoid remains; coarser at 490-500 feet; grey shale partings common.
510 - 520	Shale, grey, massive, calcareous; varies to marlstone; some buff, fine- to medium-grained limestone; ostracods.
520 - 570	Limestone, buff, fine- to medium-grained; grey shaly limestone and shale, silty; a little greenish grey siltstone; grey and brownish grey shale partings or laminae; scattered brachiopods; bryozoa at 560-570 feet.
570 - 580	Limestone, light yellow-brown, fine-grained, argillaceous, silty; darker brown shale laminae.

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Depth (feet)	Lithology
580 - 620	Limestone, buff, fine- to coarse-grained matrix containing abundant stromatoporoid and coral fragments; in part coarse crinoidal limestone; top has coarse crinoidal limestone in green waxy shale (suggests reworking); dark brown shale partings.
620 - 630	Limestone with dark grey-coated pebbles; grey to green-grey siltstone and shale; scattered fossil fragments.
630 - 660	Limestone, marly, grey, argillaceous, silty; scattered fossil fragments, some black-coated; scattered pyrite.
660	Alexandra Member
660 - 760	Limestone, grey, fine-grained, argillaceous, varies to buff, fine-grained to aphanitic; scattered crinoid fragments; shale, grey to greenish grey; some bands of coarser limestone with crinoids; bryozoa at 750-760 feet.
760 - 770	Limestone, as above, with dark-coated grains; brachiopods, crinoids.
770	<u>Hay River Formation</u>
770 - 790	Limestone, buff, fine- to coarse-grained (calcareous) matrix with scattered dolomite rhombs; stromatoporoids or algae, brachiopods; grey shale.
790 - 800	Limestone, as above, but lacking stromatoporoid or algae fragments.
800 - 840	Siltstone and limestone; siltstone, grey, slightly argillaceous; greenish grey shale partings; dark grains; carbonaceous (?) specks; glauconite (?) crinoids, <u>Tentaculites</u> .
840 - 890	Siltstone and shale, grey to greenish grey, calcareous; some bands of limestone, grey, largely composed of fossil fragments, chiefly brachiopod and crinoid debris; stromatoporoid at 880-890 feet.
890 - 900	Siltstone, shale, some limestone as above.
900 - 920	Missing.
920 - 940	Shale, greenish grey, calcareous, silty, varies to siltstone; some fragments of limestone may be cavings.

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Depth (feet)	Lithology
940 - 1,010	Shale, greenish grey, in part silty; carbonaceous specks; limestone and siltstone, probably inter-laminated with shale.
1,010 - 1,040	Shale, as above, grey, silty; a little grey, dense limestone with crinoid fragments.
1,040 - 1,080	Shale, olive-grey; a little grey, dense limestone.
1,080 - 1,110	Shale, greenish grey, calcareous.
1,110 - 1,120	Shale, as above; a little grey limestone and siltstone.
1,120 - 1,130	Shale, as above, fragments of linguloid brachiopod (?).
1,130 - 1,140	Shale, as above; limestone, yellow-brown, fine-grained, argillaceous, chunky.
1,140 -	Shale, greenish grey, calcareous; zones with siltstone laminae.

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6. Briggs Tathlina Lake No. 3 Well

Location: Lat. 60° 40' 29.49"N, Long. 117° 31' 09.56"W.

Elevation: 930 feet ground, 939 feet K.B.

Completed: 1958

Total depth: 2,890 feet

Result: Abandoned

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

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Depth (feet)	Lithology
0 - 40	Drift.
40	<u>Trout River Formation</u>
40 - 60	Poor samples, possibly all drift; fragments of grey sandy limestone and calcareous sandstone.
60 - 90	Limestone, buff, oil-stained; some fragments contain ooliths, corals; in part sandy, containing large angular quartz grains; ooliths weather out from matrix, may be reworked from Kakisa Formation below.
90	<u>Kakisa Formation</u>
90 - 130	Limestone, buff, fine- to coarse-grained matrix, largely calcarenite; abundant stromatoporoids or algae; corals.
130 - 160	Limestone, as above, and limestone, buff, fine-grained, finely silty; light greenish grey, finely silty, green shale laminae.
160 - 200	Limestone, buff, fine- to medium-grained matrix; cell structure probably stromatoporioid and coral; dark brown shale laminae.
200 (radioactivity log)	<u>Redknife Formation</u>
200 - 260	Siltstone, light grey, quartzose, grades to limestone; limestone, as above, fine- to medium-grained; fossil fragments; crinoid, brachiopods; samples poor to 260 feet.
260 - 310	Siltstone, light grey, calcareous, laminated with brown shale; scattered brachiopod and crinoid fragments.

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Depth (feet)	Lithology
310 - 330	Siltstone, grading to fine-grained sandstone, light grey, quartzose, calcareous; dark grains and a few dark inclusions; slightly porous; fragments of brachiopods, crinoids; pyrite.
330 - 340	Limestone, light grey, silty to finely sandy, angular quartz grains; sandstone, light grey, fine-grained, calcareous.
340	<u>Tathlina Formation</u>
340 - 350	Siltstone, brownish grey, calcareous, tight; grades to grey, silty limestone, fine-grained.
350 - 370	Limestone and siltstone, with brown and green shale laminae; limestone, light grey and buff, fine-grained, silty; scattered crinoid and brachiopod fragments.
370 - 390	Siltstone, light greenish grey, calcareous, quartzose; some green fissile shale.
390 - 430	Limestone, light grey, fine-grained, fossiliferous; siltstone, as above; crinoid and brachiopod fragments, some silicified.
430 - 440	Siltstone, grey and greenish grey, calcareous, in part micaceous; micaceous greenish grey shale laminae; scattered dark grains.
440 - 460	Limestone, buff, fine-grained, silty, consisting of abundant fossil fragments in finer matrix; brachiopods, crinoids; white chert.
460 - 470	Siltstone, almost sand-sized, light grey, quartzose, calcareous; scattered mica flakes and scattered dark grains; slight porosity; limy layers composed of fossil fragments; brachiopods; green shale.
470 - 500	Siltstone, light grey, finer-grained than above, calcareous, micaceous; greenish and brownish grey shale laminae.
500 - 560	Siltstone, as above, and grey, fine-grained, tightly cemented, micaceous siltstone, laminated with greenish grey, micaceous shale, platy; pyrite cubes abundant at 500-510 feet; scattered brachiopod fragments.
560 - 570	Shale, greenish grey to grey, fissile; siltstone, grey, micaceous, calcareous.

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Depth (feet)	Lithology
570 - 590	Siltstone, as above; limestone, light grey, silty.
590 - 620	Shale, greenish grey to grey, finely micaceous; siltstone, light grey, calcareous; scattered fossil fragments.
620 - 630	Limestone, light grey and buff, silty, fine-grained, tight; brachiopods abundant.
630 - 650	Shale, greenish grey to brownish grey and maroon; siltstone, light grey, as above.
650 - 680	Limestone, light grey, silty, fine-grained, contains fossil fragments and pyrite; siltstone; shale, greenish grey.
680 - 700	Siltstone, light grey, calcareous, porous; scattered brachiopod and crinoid fragments.
700 - 720	Shale, light to medium grey and greenish grey, fissile.
720 - 750	Shale, as above; siltstone and limestone, light grey, fine-grained; scattered fossil fragments.
750 - 760	Limestone, light grey, fine- to medium-grained, silty; contains abundant small brachiopod and crinoid fragments.
760 - 780	Shale, grey, greenish grey; siltstone or silty limestone as above.
780	<u>Twin Falls Formation</u>
	Upper Member
780 - 790	Limestone; buff, fine- to medium-grained, with scattered coarse grains, largely shell debris; brachiopods, crinoids, spines.
790 - 800	Limestone and siltstone, grey, pyritic, micaceous, calcareous; green shale laminae.
800 - 820	Limestone, buff, very-fine-grained; small ostracods.
820 - 830	Missing.
830 - 850	Limestone, as above; siltstone, light grey, calcareous.
850 - 870	Limestone, buff, fine-grained; fossil fragments.

Depth (feet)	Lithology
870 - 880	Siltstone, dark grey, calcareous, finely micaceous; varies to limestone; fossil fragments; limestone, buff, fine-grained, probably interbedded with siltstone.
880 - 890	Limestone, buff, fine-grained; crinoids, brachiopods.
890 - 900	Siltstone, grey, calcareous; limestone, as above; fossils.
900 - 990	Limestone, light grey, fine-grained matrix containing abundant coarser fossil fragments, silty; scattered brachiopods; grey silty shale and siltstone, probably interbedded; crinoids, ostracods, spines; punctate brachiopods.
990 - 1,000	Limestone, light grey, fine-grained, silty; interbedded shale, dark brownish grey, silty; thin flat fragments suggest lamination.
1,000 - 1,080	Limestone, grey, argillaceous, silty, grades to shale, dark grey, silty; a few brachiopod fragments; crinoids, ostracods.
1,080 - 1,100	Limestone, grey to buff, fine-grained; scattered brachiopods, crinoids; less shale than above; a little dark grey, pebbly, speckled limestone at base.
1,100 - 1,110	Limestone, light grey, earthy, argillaceous, grades to shale; grey shale partings.
1,110	Alexandra Member
1,110 - 1,150	Limestone, buff, very-fine-grained, slightly argillaceous and silty; scattered crinoids, brachiopods; brown shale laminae; scattered dolomite rhombs in part.
1,150 - 1,160	Limestone, light grey, argillaceous, earthy.
1,160 - 1,180	Limestone, buff, fine-grained; scattered fossil fragments; gastropods; brown shale laminae.
1,180	<u>Hay River Formation</u>
1,180 - 1,190	Siltstone, light grey to grey, very-fine-grained, quartzose, pyritic, micaceous; shale, grey, finely micaceous, calcareous; a little limestone, light grey, fine-grained, argillaceous; brachiopods and crinoid fragments.

Depth (feet)	Lithology
1,190 - 1,200	Shale, grey, dark grey, silty, micaceous; siltstone as above.
1,200 - 1,210	Limestone, grey, argillaceous, dense; shale, grey, silty.
1,210 - 1,220	Limestone, grey, speckled, composed of brachiopod, crinoid, bryozoan fragments, in shaly, silty matrix; pyritic; shale, grey, calcareous.
1,220 - 1,240	Shale, grey to greenish grey, calcareous, flaky.
1,240 - 1,270	Shale, as above; siltstone, grey, calcareous, tightly cemented, platy, probably as thin layers in shales; brachiopod and crinoid fragments.
1,270 - 1,290	Siltstone, light grey, calcareous, contains brachiopods and other fossil fragments, varies to limestone (calcareenite) of shelly fossils; pyrite; shale, as above.
1,290 - 1,350	Limestone, grey, speckled, composed of fossil fragments, slightly argillaceous; ostracods, some blackened <u>Tentaculites</u> ; shale, grey; siltstone, light grey, calcareous, micaceous; fragments platy, suggest thin layers.
1,350 - 1,410	Shale, grey, greenish grey and brownish grey, finely micaceous; some silty layers.
1,410 - 1,460	Shale, light grey to greenish grey, calcareous; silty laminae.
1,460 - 1,500	Shale, grey, calcareous; siltstone, light grey, calcareous, more abundant than above; pyritic; scattered fossil fragments, e.g. brachiopods, crinoids.
1,500 - 1,540	Shale, grey, calcareous.
1,540 - 1,600	Shale, grey to dark grey, slightly brownish, as above; grades to massive grey limy shale or shaly limestone, chunky fragments, silty.
1,600 - 1,700	Shale, grey, brownish grey as above; silty; limestone, light brown, fine-grained, silty; siltstone, brownish grey, argillaceous.
1,700 - 1,780	Shale, grey, calcareous, fissile.
1,780 - 1,790	Shale, as above; siltstone, grey, calcareous.

Depth (feet)	Lithology
1,790 - 1,860	Shale, grey and grey-green, splintery.
1,860 - 1,880	Shale, dark brownish grey, silty, calcareous; siltstone, light grey, calcareous, micaceous, interlaminated with brown shale; some limestone, light brown, silty; fragments of fossils.
1,880 - 1890	Shale, dark brown, silty; pyrite crystals and nodules with radiating structure in calcareous matrix; shale, green, pyritic.
1,890 - 1,900	Shale, greenish grey, brownish grey; siltstone, grey, calcareous.
1,900 - 1,910	Shale, green, grey, dark grey, almost black, splintery.
1,910 - 1,970	Shale, grey to greenish grey, flaky; siltstone, grey, calcareous, micaceous.
1,970 - 2,000	Shale, grey to dark grey, splintery.
2,000 - 2,030	Shale, light grey to greenish grey, flaky, calcareous; siltstone laminae; fossil fragments in siltstone at 2,010-2,020 feet.
2,030 - 2,050	Shale, grey, greenish grey, dark grey, splintery.
2,050 - 2,060	Shale, light grey to greenish grey; siltstone laminae.
2,060 - 2,110	Shale, grey, dark grey, splintery, in part micaceous; siltstone laminae.
2,110 - 2,120	Shale, grey, greenish grey.
2,120 - 2,170	Shale, grey, in part micaceous; silty laminae.
2,170 - 2,210	Shale, grey to dark grey, splintery.
2,210 - 2,230	Shale, grey; siltstone, grey, calcareous; pyrite.
2,230 - 2,240	Shale, dark grey to black, in part calcareous, chunky.
2,240 - 2,250	Shale, grey and dark grey, as above.
2,250 - 2,290	Shale, grey, brownish grey (possibly greenish grey burned), splintery; pyrite; light grey siltstone.

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Depth (feet)	Lithology
2, 290	Black Shale Member
2, 290 - 2, 310	Shale, black; much pyrite; limestone, light grey, fine-grained with abundant brachiopods, spines; some dark grey shale with shell fragments; pyrite.
2, 310	<u>Slave Point Formation</u>
2, 310 - 2, 320	Limestone, brown, fine-grained, pyritic; fragments with cell structure (stromatoporoid-type); some black shale with shell fragments, some pyritized.
2, 320 -	Limestone, buff, fine-grained matrix with stromatoporoid-type cell structure; some pellets; in part intergranular porosity.

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7. Briggs Foetus Lake No. 1 Well

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

Elevation: 1,077 feet ground, 1,086 feet K.B.

Completed: 1956 Total depth: 2,744 feet

Result: Abandoned

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

Depth (feet)	Lithology
0	<u>Kakisa Formation</u>
0 - 40	Limestone, cream, fine- to medium-grained matrix with abundant organic material; stromatoporoids or algae, corals, brachiopods and crinoids.
40 - 70	Siltstone, greenish grey, argillaceous, calcareous; brown carbonaceous specks; limestone, light grey, fine-grained, silty.
70 - 110	Limestone, grey and light yellow-brown, fine-grained, silty, argillaceous; carbonaceous specks; thin-shelled fossil fragments, crinoids, gastropods.
110	<u>Redknife Formation</u>
	Upper Member
110 - 150	Limestone, grey, silty; siltstone, grey, calcareous, micaceous, platy; scattered fossil fragments.
150 - 180	Siltstone, light grey to greenish grey, quartzose, calcareous, micaceous, glauconitic (?); brachiopod and crinoid fragments.
180 - 240	Limestone, grey, silty, grading to siltstone, light grey, calcareous, argillaceous, micaceous, grades to fine-grained sandstone; crinoid and brachiopod fragments; grey shale; a little chert.
240 - 260	No sample.
260 - 270	Siltstone, light grey-green, calcareous, micaceous; small fossil fragments.

Depth (feet)	Lithology
270 - 280	Limestone, grey, fine- to coarse-grained, (calcarenite), silty to sandy, speckled due to dark and dark-coated coarse grains, probably reworked; ostracods, brachiopods and crinoids.
280 - 290	Shale, green, splintery, calcareous.
290 - 300	Siltstone, and limestone as that from 180 to 270 feet.
300	Jean-Marie Member
300 - 310	Limestone, buff, fine-grained, silty; brachiopods, crinoids ostracods.
310	<u>Fort Simpson Formation</u>
310 - 340	Limestone, light grey, fine-grained, silty; siltstone, grey-green; small dark specks, probably chitinous material.
340 - 360	Siltstone, grey, argillaceous, micaceous, calcareous, slight porosity.
360 - 390	Siltstone and limestone; siltstone, grey, calcareous, micaceous; limestone, grey, fossiliferous; crinoids, brachiopods.
390 - 420	Siltstone, light grey to greenish grey, calcareous, micaceous, with scattered fossil fragments; grades to sandstone; greyish green shale.
420 - 490	Siltstone and shale interbedded; siltstone, greenish grey, calcareous, argillaceous, similar to above; shale, grey-green, calcareous, splintery; fossil fragments in zones; fine-grained, greenish grey, sandstone at 480-490 feet.
490 - 660	Shale, grey-green, calcareous, grey and reddish grey in zones; splintery; some siltstone as above.
660 - 710	Shale, siltstone, limestone; shale and siltstone as above; limestone, grey, fine-grained, silty.
710 - 780	Shale, green, grey, reddish grey as above; siltstone abundant below 740 feet.
780 - 820	Siltstone, light grey, calcareous, micaceous.
820 - 860	Siltstone as above and shale, grey, grey-green.
860 - 975	Shale, grey to greenish grey, calcareous.

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Depth (feet)	Lithology
975 - 1,000	Limestone, buff, fine-grained matrix, slightly argillaceous; abundant brachiopod, bryozoa, crinoid, ostracod fragments, fragment stromatoporoid or algae; dark grey-coated limestone pebbles at top.
1,000 - 1,040	Siltstone, grey, argillaceous, calcareous; a little light grey, fine-grained limestone and grey shale.
1,040 - 1,120	Shale and limestone; shale, grey, greenish grey, calcareous, silty; interbedded limestone, grey, fine-grained, argillaceous; siltstone, light grey, calcareous at 1,070-1,080 and 1,110-1,120 feet.
1,120 - 1,135	Limestone, buff, very-fine-grained; scattered fossil fragments.
1,135 - 1,145	Siltstone and sandstone, grey, quartzose, fine-grained; grey and green shale.
1,145 - 1,165	Limestone, buff, fine-grained; abundant crinoid and brachiopod fragments.
1,165 - 1,190	Siltstone, grey, argillaceous; limestone, grey, argillaceous.
1,190 - 1,205	Limestone, buff, fine-grained, argillaceous, tightly cemented.
1,205 - 1,240	Siltstone, white, quartzose, scattered dark grains; green mineral probably glauconite; green shale; limestone, grey, silty, argillaceous.
1,240 - 1,255	Siltstone, white, quartzose, grades to fine-grained quartzose sandstone; glauconite (?); silty limestone, light grey, coarse-grained; largely composed of fossil fragments.
1,255 - 1,280	Siltstone, light grey, micaceous, calcareous; green shale; grey argillaceous, silty limestone.
1,280 - 1,600	Siltstone and silty limestone, grey and greenish grey, micaceous, argillaceous; white quartzose sandstone, fine-grained between 1,500-1,550 feet; scattered brachiopods, bryozoa, crinoids.
1,600 - 1,880	Shale, siltstone; shale, grey, green, reddish grey, splintery; siltstone, grey, calcareous, mostly argillaceous, grades in places to fine-grained sandstone, and silty limestone; scattered brachiopods, crinoids, bryozoa ostracods.

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Depth (feet)	Lithology
1,880 - 1,920	Siltstone, limestone, shale; siltstone and shale as above; limestone, grey, silty to sandy; shell fragments abundant; small black grains.
1,920 - 1,930	Shale, grey grading to siltstone as above.
1,930 - 1,960	Limestone, grey, fine- to coarse-grained consisting of abundant shell fragments; brachiopods, ostracods; coral or stromatoporoid cell structure at 1,950-1,960 feet; siltstone and shale, as above; mica flakes, pyrite abundant.
1,960 - 2,160	Shale, greenish grey, grey; in part with carbonaceous specks.
2,160 - 2,200	Shale, grey, as above; limestone, grey, fine-grained, finely silty.
2,200	<u>Black Shale Member</u>
2,200 - 2,250	Shale, brown to black with brown streak, chunky, calcareous; pyrite abundant at base.
2,250 - 2,260	(core) Shale, black with abundant inclusion of limestone, light brown, fine-grained; stromatoporoids, <u>Amphipora</u> ; sharp contact.
2,260	<u>Slave Point Formation</u>
2,260 - 2,267	Limestone, brown, fine- to medium-grained, in part pelletoid; stromatoporoid fragments.

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8. Briggs Rabbit Lake No. 1 Well

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

Elevation: 1,058 feet ground, 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 cores stored at the Geological Survey of Canada, Calgary, Alberta.

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Depth (feet)	Lithology
0 - 20	Drift
20	<u>Trout River Formation</u>
20 - 30	Sandstone, grey, coarse-grained, quartz and dark grains (rock fragments), angular to subrounded, poorly sorted; pyrite; limestone, cream, fine-grained; cell structure resembling that of stromatoporoids or algae.
30	<u>Kakisa Formation</u>
30 - 210	Limestone, cream, fine- to coarse-grained matrix; stromatoporoids, corals abundant; oolites and pelletoid grains; calcite cement and crystals of calcite; siltstone, light grey, quartzose, calcareous.
210 - 240	Limestone, cream, fine- to medium-grained, slightly dolomitic, silty.
240	<u>Redknife Formation</u>
	Upper Member
240 - 270	Limestone, cream to light grey, very-fine- to fine-grained, silty, fossiliferous; siltstone and grey shale; thin-shelled brachiopods, crinoids. (Samples assumed incorrect; electrical log marker accepted.)
270 - 300	Siltstone, light grey to greenish grey, calcareous; varies to limestone, grey, fine-grained, silty; crinoid and brachiopod fragments.
300 - 320	Limestone, grey, silty; grey shale partings; siltstone as above.

Depth (feet)	Lithology
320 - 380	Siltstone, light grey to greenish grey, calcareous, micaceous, some layers with green minerals, possibly glauconite; greenish grey shale partings; a little limestone composed of brachiopod and crinoid fragments in part replaced by chert.
380 - 390	Shale, greenish grey, splintery; siltstone, as above.
390 - 440	Siltstone, light grey, calcareous, as above; green shale laminae; scattered crinoids and brachiopods, in part may form limestone layers.
440 - 450	Shale, grey-green, splintery.
450 - 460	Limestone, grey, fine- to coarse-grained, speckled, poorly sorted, (calcirudite), largely composed of fossil fragments; scattered silt and sand-sized quartz and dark grains; pyrite.
460 - 475	Shale, grey-green, calcareous.
475	Jean-Marie Member
475 - 495	Limestone, grey, silty; coral fragment; siltstone, grey, argillaceous; brachiopods; light green shale.
495	<u>Fort Simpson Formation</u>
495 - 530	Siltstone and silty limestone, grey to greenish grey, micaceous, calcareous; shale, grey-green.
530 - 900	Shale, greenish grey, fissile, splintery, slightly calcareous; siltstone, grey, argillaceous, probably laminae.
900 - 1,040	Shale, reddish brown, grey-green, splintery.
1,040 - 1,100	Siltstone, grey and greenish grey, calcareous; green-grey shale.
1,100 - 1,150	Shale, grey-green, slightly calcareous; siltstone as above.
1,150 - 1,450	Shale, grey-green, fissile, non-calcareous.
1,450 - 1,690	Limestone and shale; limestone, grey, fine-grained argillaceous, in part containing small black specks; shale, grey, calcareous.

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Depth (feet)	Lithology
1,690 - 1,770	Shale, grey, grey-green, brownish grey; siltstone laminae, grey, calcareous; a little fossiliferous silty limestone.
1,770 - 2,050	Shale, greyish green and brownish grey, fissile, splintery; a little grey, argillaceous, fine-grained limestone.
2,050 - 2,090	Limestone, brownish grey, fine-grained argillaceous; shale, greenish grey and maroon.
2,090 - 2,160	Shale, greyish green, fissile; siltstone laminae.
2,160 - 2,230	Limestone, grey, fine-grained, argillaceous, grades to shale, grey.
2,230 - 2,320	Shale, grey-green, splintery; scattered shaly siltstone laminae.
2,320 - 2,340	Shale, as above; abundant siltstone laminae.
2,340 - 2,382	Shale, grey to dark grey; contains abundant carbonaceous specks.
2,382	<u>Slave Point Formation</u>
2,382 - 2,393 (core)	Limestone, brown, very-fine- to fine-grained, (calclutite to calcarenite); abundant stromatoporoids, and <u>Amphipora</u> ; stromatoporoids mostly large; some smaller stromatoporoids encrusted with stromatoporoid or algal layer; in part recrystallized; sharp change.

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9. Briggs Turkey Lake No. 1 Well

Location: Lat. 61° 07'30"N, Long. 120° 22'30"W.

Elevation: 940 feet (K.B.)

Completed: 1958

Total depth: 3,142 feet

Result: Abandoned

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

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Depth (feet)	Lithology
<u>Tetcho Formation</u>	
40 - 50	Limestone, cream, buff, fine-grained, finely silty, micaceous; brown shale laminae.
50 - 60	Missing.
60 - 160	Limestone, grey-buff, silty, slightly dolomitic; grey and brown shale laminae; scattered brachiopods, crinoids, bryozoa, ostracods.
160	<u>Trout River Formation</u>
160 - 170	Siltstone, light grey, calcareous, grading to silty limestone; scattered dark grey-coated pebbles and crinoid fragments; grey and brown, irregular shale partings.
170 - 200	Siltstone, light grey, calcareous, grading to silty limestone, grey, fine-grained; shale, grey to brownish grey, probably as irregular partings.
200 - 220	Siltstone, light grey, calcareous; mica flakes; grey and greenish grey shale laminae; scattered brachiopods.
220 - 290	Siltstone, grey, greenish grey, argillaceous, micaceous; brownish grey and greenish grey shale laminae; becomes more argillaceous below 270 feet.
290 - 300	Sandstone, light grey, consists of quartz and scattered dark grains, fine-grained, porous; oolitic limestone, ooliths dark grey-stained in fine-grained matrix; dark non-oolitic fragments; pyritic.

Depth (feet)	Lithology
300 - 310	Sandstone and oolitic limestone as above; pyritic; shale, dark brown, silty; calcite inclusions, probably of organic origin; carbonaceous fragments.
310	<u>Kakisa Formation</u>
310 - 330	Limestone, buff, fine-grained matrix; abundant stromatoporoid and coral fragments.
330 - 380	Limestone, as above; siltstone, light grey, calcareous; shale, greenish grey; crinoids, brachiopods, stromatopoids; white chert at 340-350 feet.
380 - 490	Siltstone, limestone and shale interbedded; siltstone, light grey to greenish grey, argillaceous; limestone, light grey, largely composed of fossil fragments; brachiopods, bryozoa, spicules, crinoids; greenish grey shale partings.
490	<u>Redknife Formation</u>
	Upper Member
490 - 540	Shale, grey-green, fissile, micaceous; siltstone and limestone, as above.
540 - 730	Shale, grey, grey-green and maroon; small flattened organisms common in maroon shales; a few siltstone layers.
730 - 740	Limestone, buff, fine-grained matrix containing brachiopods, ostracods; pyritic, argillaceous, slightly silty; wavy brown shale laminae.
740 - 750	Shale, grey.
750	Jean-Marie Member
750 - 780	Limestone, buff to light yellow-brown, fine-grained, slightly dolomitic, silty; brachiopods, crinoids, ostracods, coral (?); brown shale laminae.
780	<u>Fort Simpson Formation</u>
780 - 1,450	Shale, grey, grey-green, reddish grey, fissile; flattened organisms; scattered siltstone laminae.

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Depth (feet)	Lithology
1,450 - 1,500	Siltstone, light grey, light greenish grey, calcareous; quartz, scattered pink and green grains; shale, grey-green, fissile, probably interlaminated with siltstone.
1,500 - 1,630	Shale, grey-green and reddish grey, same as above; minor amounts of siltstone, same as above.
1,630 - 1,800	Shale, same as above.
1,800 - 1,850	Siltstone, grey-green, calcareous; shale, grey-green, fissile.
1,850 - 1,950	Siltstone, as above; shale, dark brown and grey-green; dark brown shale with brown streak; silty at 1,890-1,900 feet.
1,950 - 2,140	Shale, greenish grey, grey.
2,140 - 2,200	Shale, as above, some green, non-calcareous 'waxy-textured' shale.
2,200 - 2,720	Shale, greenish grey, grey and a little reddish grey, fissile.
2,720	<u>Horn River Formation</u>
2,720 - 2,800	Shale, dark brownish grey, with brown streak, non-calcareous; some brown siltstone.
2,800 - 2,810	Shale, light greenish grey, slightly calcareous.
2,810 - 2,900	Shale, black-brown with dark brown streak, slightly greasy; pyrite abundant.
2,900 - 2,940	Shale, as above; limestone, buff, fine-grained, argillaceous.
2,940 - 2,970	Shale, black with brown streak; pyrite abundant.
2,970	<u>Middle Devonian Limestone</u>
2,970 - 2,980	Limestone, buff to light brown, fine-grained.
2,980 - 3,060	Limestone, brown, aphanitic, conchoidal fracture, brittle; scattered brachiopods, pelletoid at 3,050-3,060 feet.

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10. Imperial Island River No. 1 Well

Location: Lat. 60° 09' 29" N, Long. 121° 08' 16" W.

Elevation: 2,278.1 feet ground, 2,288 feet K.B.

Completed: 1954

Total depth: 8,233 feet

Result: Abandoned

Summary of log by H.R. Belyea, from samples stored at the Geological Survey of Canada, Calgary, Alberta and cores stored by the Imperial Oil Limited at Peace River, Alberta.

Depth (feet)	Lithology
Mississippian (?)	
3,464 - 3,468	Shale, brown-black with dark brown streak; thin layers of brown, finely crystalline limestone.
3,468 - 3,473 (core)	Shale and limestone interbedded; shale, as above; limestone, brown, fine-grained; top and bottom contacts wavy; 1/4 inch is pyritic, coarse-grained crinoidal sandy limestone at base; sharp contact.
Devonian	
<u>Kotcho Formation</u>	
3,473 - 3,489 (core)	Shale, light greenish grey, fissile, non-calcareous; a few grey limy shale bands.
3,490 - 3,548	Shale, greenish and brownish grey, fissile.
3,548 - 3,568 (core)	Limestone, buff and light grey, very-fine-grained, occurs as lenses and nodules separated by greenish grey shale; layers and lenses up to 1/2 inch thick; scattered crinoid fragments; a few ostracod and brachiopod fragments; scattered grey pyrite-stained 'pebbles' of limestone in bottom 10 feet.
3,568 - 3,600	Limestone, cream, very-fine-grained, slightly argillaceous leaving a white residue; light brownish grey, flaky shale partings, probably wavy; ostracods and comminuted shell debris; small gastropods.
3,600 - 3,610	Limestone, buff, fine-grained matrix containing coarse darker grey limestone pebbles and shell fragments; in part fine- to coarse-grained limestone composed of shell debris.

Depth (feet)	Lithology
3,610 - 3,630	Shale, greenish grey.
3,630 - 3,640	Shale, light grey; limestone, grey, argillaceous, very-fine-grained (marlstone).
3,640 - 3,670	Shale, grey, slightly greenish, chunky fragments, slightly micaceous, finely silty, calcareous; a few small fossil fragments.
3,670 - 3,690	Shale, as above, and limestone, buff, fine-grained; scattered brachiopod and crinoid fragments.
3,690 - 3,790	Shale, greenish grey, slightly calcareous; a few large pink-stained crinoid fragments in top 10 feet.
3,789 - 3,802 (core)	Shale, greenish grey, fissile, calcareous; scattered bands up to 1/2 inch thick of grey, dense shaly limestone; brachiopods.
3,802 - 3,809 (core)	Shale, grey; a few limestone beds as above.
3,809 - 3,880	Shale, same as above; a little grey, dense, argillaceous limestone.
3,880 - 4,060	Shale, greenish grey, splintery; a few crinoid, ostracod and brachiopod fragments; a few linguloid brachiopods.
4,060 - 4,096	Limestone, buff, fine-grained, slightly argillaceous; small fossil fragments; shale, brown to brownish grey.
4,096 - 4,106 (core)	Shale and limestone; limestone, light yellow-brown, fine-grained, argillaceous, occurring as lenses and nodules in shale, brown; scattered <u>Lingula</u> .
4,106 - 4,111 (core)	Limestone, light yellow-brown, fine-grained as above, in beds and lenses up to 2 inches thick; thin wavy layers of brown shale; scattered pyrite and small brown carbonaceous specks in limestone.
4,111 - 4,118 (core)	Limestone and shale as above, in fairly even beds about 1/2 inch to 2 inches thick; <u>Lingula</u> , brachiopods.

Depth (feet)	Lithology
4, 118 - 4, 126	(core) Limestone as above; wavy brown shale layers grade laterally to shaly limestone; some interknearing of limestone and shale.
4, 126 - 4, 150	Limestone, buff, fine-grained, as above; small fossil fragments; ostracods, brachiopods, crinoids; brown shale.
4, 150 - 4, 165	Shale, grey; limestone pebbles, dark-grey-stained; limestone as above.
4, 165	<u>Tetcho Formation</u>
4, 165 - 4, 210	Limestone, buff, fine-grained; abundant fossil fragments; crinoids, ostracods; stylolites.
4, 210 - 4, 220	Limestone, buff, mottled brown, dolomitic, argillaceous; sugary texture.
4, 220 - 4, 270	Limestone, cream, finely grained; slightly 'chalky' texture, slightly dolomitic; ostracods; brown shale laminae.
4, 270 - 4, 280	(core) Limestone, buff, very-fine-grained, mottled with brown, slightly dolomitic limy shale that gives lensing nodular character to rock; scattered brachiopod fragments; pyrite.
4, 280 - 4, 283	(core) Shale, greenish grey; irregular lenses of grey very-fine-grained argillaceous limestone.
4, 283 - 4, 290	(core) Limestone, buff, very-fine-grained, non-porous; irregular green shale laminae; scattered pyrite.
4, 290 - 4, 310	Limestone, as above, with brown shale laminae, finely micaceous.
4, 310 - 4, 340	Limestone, buff, fine-grained; a little siltstone, grey, calcareous, argillaceous.
4, 340 - 4, 380	Limestone and siltstone; limestone, grey, very-fine-grained; siltstone, grey, calcareous, argillaceous.
4, 380 - 4, 410	Limestone, grey, fine-grained, argillaceous, finely silty; brown shale laminae; scattered pyrite.
4, 410 - 4, 417	No samples.

Depth (feet)	Lithology
4,415	<u>Trout River Formation</u>
4,417 - 4,432	(core) Shale, green, calcareous; small lenses and nodules of light grey, calcareous siltstone up to 1/4 inch thick; grades to:
4,432 - 4,435	(core) Limestone, buff, fine-grained, argillaceous, slightly silty; scattered pyrite; shale, light brownish grey to greenish grey, intertongues with limestone.
4,435 - 4,470	Limestone, as above, silty.
4,470 - 4,490	Limestone and siltstone, grey to light brown, argillaceous.
4,490 - 4,500	Siltstone, as above, and shale, green, silty; fossil fragments.
4,500 - 4,520	Shale and siltstone; shale, green-grey, silty, calcareous, finely micaceous, chunky; siltstone, green-grey, argillaceous.
4,520 - 4,540	Shale, green-grey, splintery; a little siltstone.
4,540 - 4,570	Siltstone and shale, light grey, micaceous.
4,570 - 4,576	No samples.
4,576 - 4,593	(core) Siltstone and shale, thin-bedded, irregularly laminated and lensing; siltstone, light grey, calcareous, micaceous; shale, grey to dark grey, micaceous; brachiopods.
4,593 - 4,596	(core) Siltstone, light grey, quartzose, almost fine-grained sandstone; siliceous cement; thin green-grey shale laminae.
4,596 - 4,640	Siltstone as above, light grey, fine-grained, calcareous, speckled; some limestone, buff, fine-grained; pyrite at base.
4,640 - 4,650	Shale, dark brown with light brown streak; limestone brown, argillaceous, contains brachiopods.
4,650	<u>Redknife Formation</u>
	Upper Member

Depth (feet)	Lithology
4,650 - 4,700	Shale and limestone: shale, grey, fine-grained; shale, green-grey; limestone-shale contacts are arcuate, suggesting lenses or nodules.
4,700 - 4,760	Shale, green-grey, silty; limestone, light brown, fine-grained, silty.
4,760 - 4,800	Shale, green-grey, splintery; a little calcareous siltstone.
4,801 - 4,811 (core)	Shale, grey, light grey streak.
4,811 - 4,815 (core)	Shale, grey; irregular thin layers and lenses of light grey, fine-grained, silty limestone and calcareous siltstone.
4,815 - 4,818 (core)	Shale, grey; a few brachiopods and crinoids.
4,818 - 4,880	Shale, green-grey to brown-grey, splintery.
4,880 - 4,940	Shale, as above, and reddish grey.
4,940 - 5,010	Shale, green-grey.
5,010 - 5,020	Shale, as above; limestone, light grey, fine-grained, silty, almost siltstone.
5,020 - 5,090	Shale, grey, green-grey.
5,090 - 5,100	Limestone, light grey, buff, fine-grained.
5,100 - 5,120	Shale, grey, splintery.
5,120	Jean-Marie Member
5,120 - 5,130	Limestone, buff to brown, fine- to coarse-grained, argillaceous, siliceous or slightly silty.
5,130 - 5,136	Limestone, buff, fine- to medium-grained; cell structure (algae or stromatoporoid); argillaceous; dolomitic mottling; brown shale laminae.
5,136 - 5,144 (core)	Limestone, buff, fine- to medium-grained matrix, dolomitic, varying to dolomite; abundant stromatoporoids; <u>Amphipora</u> , <u>Thamnopora</u> sp., <u>Atrypa</u> sp., <u>Theodossia</u> sp.

Depth (feet)	Lithology
5,144 - 5,164 (core)	Limestone, light brown, fine-grained; shale laminae, wavy, brown; stromatoporoids, <u>Aulopora</u> sp. <u>Coenites</u> (?) sp., <u>Phacellophyllum tructense</u> McLaren, <u>Amphipora</u> , <u>Cranaena</u> (?) fragment, <u>Scutellum</u> fragment, <u>Atrypa</u> (?) sp.
5,164 - 5,170	Limestone, as above.
5,170	<u>Fort Simpson Formation</u>
5,170 - 5,400	Shale, dark grey, splintery; a few siltstone laminae below 5,350 feet.
5,400 - 5,407	No samples.
5,407 - 5,427	Shale, greenish grey, calcareous; thin layers of grey, coarsely micaceous, calcareous siltstone with pyrite and green grains; grey, very-fine-grained, argillaceous limestone; worm burrows (?).
5,427 - 5,460	Shale and siltstone, as above.
5,460 - 5,490	Sandstone, dark brown, fine-grained, slightly dolomitic, quartz grains, angular, with dark material between grains; fossil fragments.
5,490 - 5,577	Siltstone, grading to fine-grained sandstone, grey, micaceous; shale, light brownish grey, micaceous, slightly calcareous.
5,577 - 5,597 (core)	Siltstone, grey, micaceous, calcareous, almost fine-grained sandstone; quartz and dark grains; laminated with grey fissile shale; infilled worm burrows.
5,597 - 5,710	Siltstone and shale, as above.
5,710 - 5,750	Shale, brownish grey, splintery; scattered siltstone laminae.
5,750 - 5,770	Shale, brownish grey to brown, splintery; sandstone, grey, calcareous.
5,770 - 5,780	Siltstone, grey, calcareous, as above.
5,780 - 5,800	Shale, grey, splintery.
5,800 - 5,810	Shale, dark brown with light brown streak, in part with dark brown streak.

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Depth (feet)	Lithology
5,810 - 5,895	Shale, grey, splintery; siltstone, light grey, calcareous.
5,895 - 5,910	(core) Shale, greenish grey, fissile; scattered thin siltstone laminae, micaceous, calcareous.
5,910 - 5,930	Shale, siltstone, as above.
5,930 - 6,234	Shale, grey, non-calcareous, splintery.
6,234 - 6,249	(core) Shale, greenish grey; a few brachiopods, <u>Lingula</u> .
6,249 - 6,800	Shale, as above.
6,800 - 6,815	(core) Shale, grey, splintery.
6,815 - 6,840	Shale, grey, as above; darker grey laminae, some with brown streak; possibly siliceous; pyrite.
6,840 - 6,890	Shale, grey, brownish grey, splintery; silty laminae.
6,890	Black Shale Member
6,890 - 6,900	Shale, dark grey with brown streak.
6,900 - 6,910	Shale, black with dark brown streak; hard black siliceous nodules; pyrite abundant.
6,910	<u>Middle Devonian Limestone (Slave Point ?)</u>
6,910	Limestone, brown, very-fine-grained; bands of <u>Amphipora</u> ; tightly cemented with calcite.

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11. Gulf States Kotcho Lake d-39-J

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

Elevation: 1,999 feet ground, 2,011 feet K.B.

Completed: 1960

Total depth: 8,416 feet

Result: Gas well

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

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Depth (feet)	Lithology
3,620	<u>Kotcho Formation</u>
3,620 - 3,630	Limestone, light grey, fine- to coarse-grained, crystalline; brachiopods, crinoids; pyrite; glauconite.
3,630 - 3,650	Limestone and shale; limestone, grey, fine-grained, argillaceous; shale, grey, slightly calcareous.
3,650 - 3,670	Limestone, light grey, fine-grained with scattered to abundant large brown limestones, grains consisting of fine-grained limestone; grains are elongate to rounded, pitted surfaces, most grains not coated but a few with light brown asymmetrical coating; grains slightly more than 0.1 mm in diameter; scattered crinoid fragments.
3,670 - 3,720	Shale, grey, slightly calcareous, finely micaceous.
3,720 - 3,770	Limestone and shale; limestone, light grey, fine-grained, slightly argillaceous; shale, grey, as above; scattered crinoid and brachiopod fragments.
3,770 - 3,800	Shale, grey, varying to very-fine-grained grey shaly limestone.
3,800 - 3,850	Shale, grey, slightly calcareous.
3,850 - 3,890	Shale, as above; limestone, light grey, very-fine-grained, argillaceous; a few crinoid and brachiopod fragments.
3,890 - 3,940	Shale, grey, slightly calcareous; some argillaceous limestone as above; scattered crinoids.

Depth (feet)	Lithology
3,940	<u>Tetcho Formation</u>
3,940 - 3,950	Limestone, buff, very-fine-grained, even-textured.
3,950 - 3,960	Limestone, buff, very-fine-grained (aphanitic) matrix; abundant coarse calcite grains, mostly of organic debris; a few dark grains.
3,960 - 3,980	Limestone, buff, very-fine-grained; argillaceous; grey shale.
3,980 - 4,100	Limestone, buff, very-fine-grained, (calcilutite); brown shale laminae; a few brachiopod fragments and ostracods; brown shale laminae at 4,080-4,100 feet.
4,100 - 4,170	Limestone, light grey to buff, very-fine-grained, (calcilutite); brown, slightly silty shale laminae; a little brown finely crystalline dolomite, euhedral with intercrystalline porosity at 4,160-4,170 feet.
4,170 - 4,180	Limestone, buff, very-fine-grained matrix, scattered to abundant dark grey grains, 0.5 to 1.5 mm in long diameter, some dark coated; others very-fine-grained limestone; shell fragments, ostracods.
4,180	<u>Trout River Formation</u>
4,180 - 4,200	Limestone, light grey, silty, fine-grained; scattered dark grey inclusions, pyritic, possibly pebbles.
4,200 - 4,220	Siltstone, light grey calcareous, in part argillaceous finely micaceous, grading to shale, in part hard tightly cemented; dark grey, pyritic 'pebbles' at 4,210-4,220 feet.
4,220 - 4,260	Siltstone, as above, and limestone, buff, fine-grained, silty; scattered brachiopods, ostracods, crinoids; grey and brown shale laminae at 4,240-4,260 feet; scattered pyrite.
4,260 - 4,270	Siltstone, light grey calcareous, quartz and dark grains; limestone, grey; abundant fossil fragments; large dark grains and dark-coated fossil fragments; pyrite.

Depth (feet)	Lithology
4, 270	<u>Kakisa Formation</u>
4, 270 - 4, 290	Limestone, buff to brown, fine- to coarse-grained, (calcarenite); abundant brachiopod and crinoid fragments, ostracods, spines, probably forming bioclastic limestone; in part argillaceous.
4, 290 - 4, 310	Limestone, brown, very-fine-grained; some brown silty argillaceous limestone; grey and brown shale; brachiopods.
4, 310	<u>Redknife Formation</u>
	Upper Member
4, 310 - 4, 400	Shale, grey, micaceous, slightly calcareous, silty; a little siltstone and limestone, grey, silty, very-fine-grained; brachiopod and crinoid fragments.
4, 400 - 4, 430	Shale, grey, greenish grey, fissile, non-calcareous to slightly calcareous.
4, 430 - 4, 440	Limestone, grey, irregularly stained yellow (limonite ?) and red; coarse-grained varying to fine-grained matrix with coarse shell fragments and pebbles of red and grey shale (calcirudite); brachiopods, crinoids.
4, 440 - 4, 480	Shale, grey, non-calcareous, fissile.
4, 480 - 4, 490	Shale as above; limestone, brown, fine-grained; sparry calcite cement; brachiopods.
4, 490 - 4, 680	Shale, grey, non-calcareous, as above; a little silty limestone and siltstone at 4, 580-4, 590 feet.
4, 680 - 4, 705	Limestone, brown, very-fine-grained, in part with hackly fracture; a few dark grey, small 'pebbles'; a little light quartzose siltstone and shale as above.
4, 705	Jean-Marie Member
4, 705 - 4, 730	Limestone, brown, fine-grained, in part mottled with brown, finely crystalline, euhedral dolomite; a few coral fragments.
4, 730 - 4, 750	Limestone, buff, fine-grained, drills chalky.

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Depth (feet)	Lithology
4,750 - 4,760	Limestone, buff, fine- to coarse-grained; spines, brachiopods abundant; a few dark grey 'pebbles' of limestone.
4,760	<u>Fort Simpson Formation</u>
4,760 - 4,990	Shale, grey, non-calcareous; a little siltstone, grey, tightly cemented, calcareous, platy fragments suggest laminae only; dark grey platy non-calcareous siltstone at 4,910-4,920 and 4,940-4,950 feet; mica flakes at shale-siltstone boundaries.
4,990 - 5,000	Shale and siltstone; shale, as above; siltstone, light grey, calcareous; coarse mica flakes.
5,000 - 5,100	No samples.
5,100 - 5,200	Shale and siltstone; shale as above; siltstone, light grey, calcareous; large mica flakes; in part siltstone seems to form thick sequences separated by grey shale.
5,200 - 5,550	Shale, grey and greenish grey, splintery, non-calcareous; scattered silty laminae.
5,550 - 5,610	Shale, as above; siltstone, greenish grey, light grey and a little dark grey, calcareous; large mica flakes.
5,610 - 5,730	Shale, grey, dark grey, as above; silty shale laminae and a few beds of siltstone, light grey, calcareous, micaceous.
5,730 - 6,320	Shale, grey, greenish grey, dark grey, non-calcareous, splintery.
	Black Shale Member
6,320 - 6,410	Shale, black with dark brown streak, non-calcareous, pyritic.
6,410	<u>Slave Point Formation</u>
6,410 -	Limestone, brown, mottled black, aphanitic, tightly cemented, hackly fracture; cell structure poorly preserved, suggests <u>Amphipora</u> and stromatoporoids.

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

Location: c-28-D/94-O-1

Elevation: 940.6 feet ground, 953.5 feet K.B.

Completed: 1959

Total depth: 7,614 feet

Result: Abandoned

Summary of log by C.K. Harris, from samples stored at the Geological Survey of Canada, Calgary, Alberta.

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Depth (feet)	Lithology
	<u>Wabamun Group</u>
	<u>Kotcho Formation</u>
3,200	
3,200 - 3,320	Limestone, grey, fine-grained, argillaceous, finely silty; shale, greenish grey, calcareous, finely micaceous, slightly silty; ostracods, crinoids; some limestone layers composed of fossil fragments.
3,320 - 3,670	Shale, greenish grey, slightly calcareous; some grey shaly limestone.
3,640	
	<u>Tetcho Formation</u>
3,640 - 3,760	Limestone, light grey, very-fine-grained, argillaceous; scattered pyrite; a few brachiopod and crinoid fragments; a little brown, finely crystalline, euhedral dolomite from 3,690-3,720 feet.
3,760 - 3,790	Limestone, as above; large dark-coated grains; brachiopods and crinoid fragments; slightly silty brown shale laminae; pyrite.
3,790	
	<u>Trout River Formation</u>
3,790 - 3,980	Siltstone, grey, greenish grey, calcareous, argillaceous, quartz and scattered dark grains; shale, grey, slightly calcareous, finely micaceous, silty.
3,975	
	<u>Kakisa Formation</u>
3,980 - 4,040	Limestone, buff to light brown, very-fine-grained, in part argillaceous; brown shale partings.

Depth (feet)	Lithology
4, 040	<u>Unnamed Shale Unit</u>
4, 040 - 4, 080	Shale, grey to greenish grey, slightly calcareous; some limestone, grey, fine-grained, argillaceous; some composed of crinoid and brachiopod fragments.
4, 080 - 4, 190	Shale, as above; siltstone, greenish grey, calcareous, argillaceous, micaceous.
4, 190 - 4, 250	Shale, grey, non-calcareous.
4, 250 - 4, 290	Shale, as above; siltstone, grey, calcareous, micaceous.
4, 290 - 4, 400	Shale, grey, as above, in places silty and with silty laminae.
4, 400 - 4, 420	Shale, as above; some siltstone, dark grey almost black.
4, 420 - 4, 450	Shale and siltstone, grey, calcareous, argillaceous; grades to limestone with fossil fragments.
4, 450 - 4, 520	Shale, as above; siltstone, dark grey-brown, argillaceous, tightly cemented, in part calcareous; brachiopod fragments.
4, 520 - 6, 060	Shale, grey, greenish grey, non-calcareous, splintery; scattered grey siltstone laminae, gradually becomes grey to dark grey below 5, 500 feet.
6, 060 - 6, 150	Shale, grey to dark grey, non-calcareous, splintery; black silty shale with dark brown streak at 6, 060-6, 080 and 6, 140-6, 150 feet.
6, 150 - 6, 160	Shale, as above; siltstone, grey, calcareous; crinoid fragments.
6, 160 - 6, 310	Shale, grey, to dark grey as above; siltstone, black, slightly calcareous; scattered pyrite at 6, 250-6, 270 feet.
6, 310	Black Shale Member
6, 310 - 6, 330	Shale, black with dark brown streak.
6, 330 - 6, 390	No samples.

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Depth (feet)	Lithology
6,390 - 6,520	Shale, black with dark brown streak; limestone, brown, fine-grained, in part dolomitic; varies to dark brown almost black argillaceous limestone and limy shale, some dark grey silty limestone; chert, grey to black at 6,430-6,450 feet; crinoid fragments at 6,410-6,420 feet (samples poor and finely ground up).
6,520	<u>Shale Unit, probably Middle Devonian</u>
6,520	Shale, grey, dark grey; scattered silty shale and limestone layers.

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13. (Gulf States) Evie Lake No. 1 Well

Location: b-90-G/94-J-14 (mile 321, Alaska Highway)

Elevation: 1,631.5 feet ground, 1,643 feet K.B.

Completed: 1956

Total depth: 7,615 feet

Result: Abandoned

Summary of log by H.R. Belyea, from samples stored at the Geological Survey of Canada, Calgary, Alberta and cores stored at the Department of Mines and Petroleum Resources, Charlie Lake, British Columbia.

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Depth (feet)	Lithology
3,710	<u>Kotcho Formation</u>
3,710 - 3,720	Limestone, buff to grey, fine-grained, argillaceous, pyritic.
3,720 - 3,750	Shale, grey, calcareous, chunky.
3,750 - 3,760	Shale, black, with dark brown streak; shale, as above.
3,760 - 3,770	Shale, grey, fissile, slightly calcareous.
3,770 - 3,820	Shale, as above; and grey, very-fine-grained argillaceous limestone.
3,820 - 3,870	Shale, grey, calcareous, chunky.
3,870 - 3,880	Shale, as above; some black shale with brown streak.
3,880 - 3,900	Shale, grey, calcareous, as above.
3,900 - 3,920	Shale, black, with brown streak; in-part hard, possibly siliceous; grey shale, as above.
3,920 - 3,960	Shale, grey, calcareous.
3,960 (radioactivity and electrical logs)	<u>Tetcho Formation</u>
3,960 - 4,010	Limestone, grey, very-fine-grained, slightly argillaceous, finely silty; shale, brownish grey, slightly calcareous, silty, probably as laminae in limestone; scattered pyrite; small thin-shelled fossil fragments.

Depth (feet)	Lithology
4, 015	<u>Trout River Formation</u>
4, 010 - 4, 030	Siltstone, light grey, slightly calcareous; slight intergranular porosity; scattered pyrite.
4, 030 - 4, 040	Poor sample.
4, 040 - 4, 050	Limestone, light grey, silty; grey shale.
4, 050 - 4, 080	Siltstone, light grey, quartzose, calcareous, porous; shale, grey, finely micaceous, chunky.
4, 080	<u>Unnamed Shale Unit</u>
4, 080 - 4, 090	Siltstone, as above; shale, grey, splintery.
4, 090 - 4, 150	Shale, grey, slightly calcareous, fissile.
4, 150 - 4, 160	Siltstone, light grey, calcareous, slightly argillaceous, finely micaceous; brachiopods.
4, 160 - 4, 180	Shale, grey, silty, micaceous, calcareous; siltstone, light grey, calcareous, argillaceous.
4, 180 - 4, 410	Shale, grey, finely micaceous, slightly calcareous; silty shale layers at intervals not definitely determinable from samples.
4, 410 - 4, 440	Shale, as above; siltstone, light grey, calcareous, micaceous.
4, 440 - 4, 490	Shale, as above.
4, 490 - 4, 540	Shale, as above; light grey argillaceous, calcareous siltstone interlaminated.
4, 540 - 4, 550	Shale, grey and dark brownish grey.
4, 550 - 6, 240	Shale, grey, slightly calcareous, fissile, becoming brownish grey and more splintery downwards; a few fragments of black shale with a brown streak at 5, 410-5, 430 feet.
6, 240 (gamma-ray log)	<u>Black Shale Unit</u>
6, 240 - 6, 260	Missing.
6, 260 - 6, 287 (core)	Shale, black, with dark brown streak, non-calcareous, hard; scattered pyrite.

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Depth (feet)	Lithology
6, 287 - 6, 295	Shale, black, with dark brown streak; a little pyrite.
6, 295 - 6, 395	Shale, grey, as above; and black with brown streak; scattered pyrite; some samples missing.
6, 395 - 6, 440	Missing.
6, 440 - 6, 675	Shale, black with dark brown streak, hard, non-calcareous; grey shale present in samples interpreted as coming from above in view of high gamma ray throughout; a few fragments of black shale show Pteropod-like organisms.
6, 675 - 6, 680	Shale, black, with brown streak; sandstone, grey, coarse-grained, quartz, feldspar (?), dark grains, angular; pyrite.
6, 680 - 6, 690	Shale, black, with dark brown streak; white calcareous specks abundant; in part siliceous, pyritic.
6, 690 - 6, 700	Sandstone, light grey, quartzose, angular, poorly sorted; angular dark grains; limestone, probably from below.
6, 700	<u>Middle Devonian Limestone</u>
6, 700 - 6, 720	Limestone, dark brown, argillaceous; shale, black, with brown streak, calcareous, scattered fossil shell fragments.

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