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LOWER PALEOZOIC STRATIGRAPHY OF NORTHERN YUKON TERRITORY AND NORTHWESTERN DISTRICT OF MACKENZIE

D.W. Morrow

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View to the south of the Wind River and Wernecke Mountains. Royal Mountain, formed of Ordovician Bouvette Formation carbonates, is visible in the middle of the photo (GSC Calgary photo 4683-3)

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PREFACE

This bulletin outlines the lower Paleozoic stratigraphy of northwestern mainland Canada in the Yukon and Northwest Territories. The Eagle Plain and Richardson Mountains occupy the approximate centre of this region. Previous studies of the lower Paleozoic have dealt either with outcrop or surface sections (Operation Porcupine), or with subsurface well sections, but did not integrate these data. This has led to the development of inconsistent stratigraphic nomenclatures for surface versus subsurface studies and an inability to form a consistent sequence stratigraphic model for the lower Paleozoic in this area.

This bulletin presents a stratigraphic synthesis based on data from surface exposures in the mountains surrounding Eagle Plain (Ogilvie, Wernecke and Richardson mountains) and on subsurface borehole data from beneath Eagle Plain and from the Interior Plain bordering the east flank of Richardson Mountains. Industry workers now have an internally consistent stratigraphic framework that can be applied equally to the lower Paleozoic in the subsurface or in outcrop. The positions of carbonate–to–shale transitions (Richardson Trough, Blackstone Trough), which commonly exert a strong control on structural evolution and on the occurrence of sedimentary mineral deposits and hydrocarbons, have also been more accurately delineated.

A detailed sedimentological analysis of the Ogilvie Formation, the most prospective lower Paleozoic unit for the occurrence of hydrocarbon reservoirs, is included here, along with a map of thermal maturity at the top of the Ogilvie.

M.D. Everell
Assistant Deputy Minister
Earth Sciences Sector

PRÉFACE

Le présent bulletin porte sur la stratigraphie du Paléozoïque inférieur de la partie nord-ouest de la masse continentale du Canada comprenant le Yukon et les Territoires du Nord-Ouest. À peu près au coeur de cette région se trouvent la plaine d'Eagle et les monts Richardson. Les études précédentes sur le Paléozoïque inférieur n'ont porté que sur des affleurements ou des profils de surface (Opération Porcupine) ou des profils dans des puits. Ces données n'ayant jamais été intégrées, il s'en est suivi des incohérences entre les nomenclatures stratigraphiques utilisées lors d'études de la surface et de la subsurface, d'où l'impossibilité de créer un modèle cohérent de séquence stratigraphique pour le Paléozoïque inférieur dans cette région.

Ce bulletin vise à présenter une synthèse stratigraphique des données provenant d'affleurements dans les monts entourant la plaine d'Eagle (monts Ogilvie, Wernecke et Richardson) et des données de forages recueillies dans la plaine d'Eagle et les plaines Intérieures bordant le flanc oriental des monts Richardson. Les travailleurs de l'industrie disposent maintenant d'un cadre stratigraphique cohérent qui peut s'appliquer au Paléozoïque inférieur tant pour les affleurements que pour la subsurface. Les emplacements des transitions roches carbonatées à shales (cuvette de Richardson et cuvette de Blackstone), qui normalement exercent un contrôle marqué sur l'évolution structurale et sur la présence de gisements de minéraux et d'hydrocarbures dans les roches sédimentaires, ont également été déterminés avec une plus grande précision.

Une analyse sédimentologique approfondie de la Formation d'Ogilvie, l'unité du Paléozoïque inférieur la plus prometteuse quant à la présence de réservoirs d'hydrocarbures, est présentée ainsi qu'une carte de la maturité thermique au sommet de la Formation d'Ogilvie.

M.D. Everell
Sous-ministre adjoint
Secteur des sciences de la Terre

Frontispiece: *View downstream of the Peel River Canyon south of the Richardson Mountains in the Wind River map area (NTS 106E). Flat-lying, shaly, dark grey to yellowish grey, thin bedded, slope- and basin-deposited dolostones of the lower part of the Road River Group (Cambrian and Ordovician Rabbitkettle Formation) form the canyon walls (ISPG photo 4298-24).*

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LOWER PALEOZOIC STRATIGRAPHY OF NORTHERN YUKON TERRITORY AND NORTHWESTERN DISTRICT OF MACKENZIE

Abstract

Lower Paleozoic strata within northern Yukon Territory and northwestern District of Mackenzie include the Mackenzie–Peel Shelf sequence and strata westward to the region of the Yukon Stable Block in northern Yukon Territory. These early Paleozoic paleogeographic provinces were separated by the Richardson Trough and by the Knorr Block, a local region of uplifted Precambrian strata immediately south of the Richardson Mountains. High-angle faults bounding Richardson Trough and the Knorr Block may have been active in early Paleozoic time, causing a degree of tectonic decoupling between the Mackenzie–Peel Shelf and the Yukon Stable Block. The Knorr Block contains an anomalously thin lower Paleozoic sequence and several unconformities, indicating that it underwent episodes of differential uplift and subsidence with respect to both the Mackenzie–Peel Shelf and the Yukon Stable Block.

This tectonic decoupling led to the development of distinctly different lower Paleozoic depositional histories and lithostratigraphies east and west of Richardson Trough. Lower Paleozoic stratigraphy of the Mackenzie–Peel Shelf sequence conforms to the second-order sequence stratigraphy developed across continental North America. These second-order sequences are poorly developed across the Yukon Stable Block and their bounding unconformities are less evident than on the Mackenzie–Peel Shelf. Laterally continuous marker beds and distinctive subsurface log markers are not well developed in the lower Paleozoic of the northern Yukon.

The profound lithostratigraphic differences between regions support the necessity of different stratigraphic nomenclatures. The use of the Michelle and Ogilvie formations in northern Yukon Territory is reaffirmed. The Peel, Tatsieta, Arnica, Landry and Hume formations are restricted to areas east of Richardson Mountains and the Knorr Range. A new formation name, the Bouvette Formation, is applied to a 500 to 1000 m-thick shallow-water carbonate sequence formerly mapped as the ЄDb map unit during Operation Porcupine. The Mount Dewdney Formation, another new formation, includes yellow and orange weathering, silty and sandy, thin bedded and mudcracked tidal-flat dolostones that rest unconformably on the Bouvette Formation in the region of the Dave Lord High on the west side of the Yukon Stable Block. The Ogilvie and Bouvette formations are the most prospective subsurface hydrocarbon reservoir units in the subsurface of Eagle Plain.

Résumé

Les strates du Paléozoïque inférieur situées dans le nord du Yukon et dans le nord-ouest du district de Mackenzie englobent la séquence de la plate-forme de Mackenzie–Peel et les strates à l'ouest jusqu'au bloc stable du Yukon dans le nord du Territoire du Yukon. Ces provinces paléogéographiques du Paléozoïque précoce étaient séparées par la cuvette de Richardson et le bloc de Knorr, région locale de strates précambriennes soulevées immédiatement au sud des monts Richardson. Les failles à fort pendage bordant la cuvette de Richardson et le bloc de Knorr ont peut-être été actives au Paléozoïque précoce, produisant un certain découplage tectonique entre la plate-forme de Mackenzie–Peel et le bloc stable du Yukon. Le bloc de Knorr comprend une séquence du Paléozoïque inférieur anormalement mince et plusieurs discordances, ce qui indique qu'il a subi des épisodes de soulèvement et de subsidence différentiels par rapport à la plate-forme de Mackenzie–Peel et au bloc stable du Yukon.

Ce découplage tectonique a donné lieu à une évolution séquentielle et à des lithostratigraphies du Paléozoïque inférieur très distinctes à l'est et à l'ouest de la cuvette de Richardson. La stratigraphie du Paléozoïque inférieur de la séquence de la plate-forme de Mackenzie–Peel conrrespond à la stratigraphie des séquences de deuxième ordre formées en Amérique du Nord continentale. Ces séquences de deuxième ordre sont très peu développées sur le bloc stable du Yukon et leurs discordances bordières sont moins évidentes que sur la plate-forme de Mackenzie–Peel. Les horizons repères latéralement continus et les marqueurs caractéristiques dans les diagraphies sont peu développés dans les couches du Paléozoïque inférieur du Yukon septentrional.

Les énormes différences lithostratigraphiques entre ces régions montrent la nécessité d'élaborer des nomenclatures stratigraphiques différentes. Il est juste d'utiliser les formations de Michelle et d'Ogilvie pour le Yukon septentrional. Les formations de Peel, de Tatsieta, d'Arnica, de Landry et de Hume sont limitées à des régions à l'est des monts Richardson et du chaînon Knorr. Une nouvelle formation, la Formation de Bouvette, comporte une séquence de roches carbonatées d'eau peu profonde de 500 à 1000 m d'épaisseur qui avait été désignée lors de l'Opération Porcupine comme l'unité cartographique ЄDb. Une autre nouvelle formation, la Formation de Mount Dewdney, est constituée de minces lits de dolomies intertidales silteuses et sableuses, à couleur d'altération jaune et orangée et à polygones de dessication, qui reposent en discordance sur la Formation de Bouvette dans la région de la hauteur de Dave Lord du côté ouest du bloc stable du Yukon. Pour ce qui est de la présence de réservoirs d'hydrocarbures, les formations d'Ogilvie et de Bouvette sont les unités les plus prometteuses de la subsurface de la plaine d'Eagle.

Summary

The lower Paleozoic sequence of northern Yukon Territory and the adjoining part of the northwestern District of Mackenzie straddles the transition from continental North America, represented by the Mackenzie–Peel Shelf sequence, to the region of the Yukon Stable Block in the northern Yukon Territory. In the early Paleozoic, these paleogeographic provinces were separated by the Richardson Trough and the Knorr Block, a local region of uplifted Precambrian strata immediately south of the Richardson Mountains. Lower Paleozoic strata of the Mackenzie–Peel Shelf are a contiguous part of the lower Paleozoic sedimentary cover of the North American continental interior.

High-angle faults bounding Richardson Trough and the Knorr Block may have been active in early Paleozoic time and may have caused the Mackenzie–Peel Shelf and the Yukon Stable Block to undergo different subsidence histories. This is indicated by the difference between the approximate average thicknesses of lower Paleozoic strata between these two areas. Lower Paleozoic strata across the Yukon Stable Block maintain an average thickness of about 2500 ± 200 m, whereas the Mackenzie–Peel Shelf sequence is only 1900 ± 100 m thick.

The Knorr Block itself contains an anomalously thin, lower Paleozoic (700 m) sequence that includes several unconformities. This may indicate that it underwent episodes of differential uplift and subsidence with respect to both the Mackenzie–Peel Shelf and the Yukon Stable Block and that the Knorr Block was a zone of crustal weakness and vertical mobility in early Paleozoic time.

This tectonic decoupling led to the development of distinctly different lower Paleozoic platform carbonate lithostratigraphies east and west of Richardson Trough. Lower Paleozoic stratigraphy of the Mackenzie–Peel Shelf sequence conforms to the second-order sequence stratigraphy developed across continental North America. The Sauk Sequence is represented by the Franklin Mountain Formation, and farther east, by the Mount Cap and Mount Clark to Franklin Mountain formational succession above a basal 'sub-Cambrian unconformity'. The Tippecanoe Sequence is represented by the Mount Kindle Formation above a mid-Ordovician unconformity. The lower part of the succeeding Kaskaskia Sequence is represented by the brightly coloured, silty and sandy, mudcracked, tidal-flat dolostones and dololaminites of the Delorme Group, including the Peel and Tatsieta formations, which pass upward to the shallow-water, moderately fossiliferous, clean dolostones of the Arnica Formation and to the unfossiliferous, somewhat restricted shallow-water, unfossiliferous and pelletal packstones of the Landry Formation, and finally to the distinctive, shallowing-upward, argillaceous, open-marine, fossiliferous lime wackestones of the Hume Formation. The basal unit of this sequence, the Delorme Group, directly overlies a well developed 'sub-Devonian unconformity', separating the Kaskaskia Sequence from the underlying Tippecanoe Sequence. Laterally continuous marker beds and distinctive intraformational subsurface log markers are well developed in the Mackenzie–Peel Shelf sequence.

These second-order sequences are poorly developed or absent across the Yukon Stable Block, and their bounding unconformities less recognizable. The mid-Ordovician unconformity separating the Sauk and Tippecanoe sequences is absent in this region and the sub-Devonian unconformity is developed only across the Dave Lord High on the west side of the Yukon Stable Block. Mid-Ordovician to lowermost Devonian basinal shales of the Road River Formation are present within the platform carbonate sequence throughout

the Yukon Stable Block. These shales have no counterpart within the Mackenzie–Peel Shelf sequence. Laterally continuous marker beds and distinctive subsurface log markers are not well developed in the lower Paleozoic of the northern Yukon.

These profound lithostratigraphic differences indicate that different stratigraphic nomenclatures should be applied to these regions. The use of the Michelle and Ogilvie formations in northern Yukon Territory is reaffirmed. The Peel, Tatsieta, Arnica, Landry and Hume formations are restricted to areas east of Richardson Mountains and the Knorr Range. A new formation name, the Bouvette Formation, is applied to a 500 to 1000 m-thick shallow-water carbonate sequence formerly mapped as the ЄDb map unit during Operation Porcupine. The lower part of this unit is equivalent in age to the Ronning Group, but the Bouvette Formation also contains isolated Silurian to Early Devonian carbonate platform sequences, such as Royal Mountain Platform in the region of Blackstone Trough. The Mount Dewdney Formation, another new formation, includes yellow and orange weathering, silty and sandy, thin bedded and mudcracked tidal flat dolostones that rest unconformably on the Bouvette Formation in the region of the Dave Lord High on the west side of the Yukon Stable Block.

The Ogilvie Formation was deposited during a continuous marine transgression from Emsian to Eifelian time after shoal conditions developed at the end of deposition of the Michelle Formation. Early Ogilvie deposition occurred in a carbonate shelf setting with a robust stromatoporoid shelf-margin rim facies. Fenestral dolostones accumulated in the restricted lagoonal environment created behind this shelf rim. Later Ogilvie deposition took place on a carbonate ramp setting with little or no definite shelf-margin break in slope. Transgressive deposition resulted in basinal deposits advancing toward the Ogilvie platform interior and onlap of shallower water shelf carbonates. A more aggradational style of Ogilvie deposition took place during the third-order sea-level declines that caused regressions across the Mackenzie–Peel Shelf.

The Ogilvie and Bouvette formations are the most prospective subsurface hydrocarbon reservoir units in the subsurface of Eagle Plain. The late Paleozoic time of maturation of organic material in Canol and Road River shale source beds implies that hydrocarbon entrapment was more efficient in pre-Laramide than in post-Laramide traps. At least three types of pre-Laramide trap types may have entrapped hydrocarbons. One is structural, involving pre-Laramide long-wavelength anticlines; another is stratigraphic, involving the carbonate–to–shale transition along the flanks of Richardson and Blackstone troughs; and the third is diagenetic, involving late Paleozoic fracturing and dolomitization of Ogilvie limestones.

Sommaire

La séquence du Paléozoïque inférieur dans le nord du Territoire du Yukon et la partie contiguë du nord-ouest du district de Mackenzie chevauche la transition entre l'Amérique du Nord continentale, représentée par la séquence de la plate-forme de Mackenzie–Peel, et la région du bloc stable du Yukon située dans le nord du Yukon. Au Paléozoïque précoce, ces provinces paléogéographiques étaient séparées par la cuvette de Richardson et le bloc de Knorr, région locale de strates précambriennes soulevées immédiatement au sud des monts Richardson. Les strates du Paléozoïque inférieur de la plate-forme de Mackenzie–Peel sont contiguës à la couverture sédimentaire du Paléozoïque inférieur de l'intérieur de l'Amérique du Nord continentale.

Il est possible que les failles à fort pendage bordant la cuvette de Richardson et le bloc de Knorr aient été actives au Paléozoïque précoce et aient été à l'origine du fait que l'histoire de la subsidence de la plate-forme de Mackenzie–Peel et du bloc stable du Yukon sont différentes, comme en témoignent les différentes épaisseurs moyennes approximatives des strates du Paléozoïque inférieur dans ces deux régions. L'épaisseur moyenne des strates du Paléozoïque inférieur du bloc stable du Yukon est de 2500 ± 200 m, alors que celle des strates de la séquence de la plate-forme de Mackenzie–Peel n'est que de 1900 ± 100 m.

Le bloc de Knorr comprend lui-même une séquence du Paléozoïque inférieur anormalement mince de 700 m qui comporte plusieurs discordances, ce qui pourrait indiquer qu'il a subi des épisodes de soulèvement et de subsidence différentiels par rapport à la plate-forme de Mackenzie–Peel et au bloc stable du Yukon et qu'il était une zone de faiblesse de la croûte et de mobilité verticale au Paléozoïque précoce.

Ce découplage tectonique a donné lieu à des lithostratigraphies très différentes de plate-forme carbonatée du Paléozoïque inférieur à l'est et à l'ouest de la cuvette de Richardson. La stratigraphie du Paléozoïque inférieur de la séquence de la plate-forme de Mackenzie–Peel est conforme à la stratigraphie des séquences de deuxième ordre qui s'est formée en Amérique du Nord continentale. La Séquence de Sauk est représentée par la Formation de Franklin Mountain et, plus à l'est, par la succession des formations de Mount Cap et de Mount Clark à la Formation de Franklin Mountain au-dessus d'une discordance de base sous le Cambrien. La Séquence de Tippecanoe est représentée par la Formation de Mount Kindle au-dessus d'une discordance de l'Ordovicien moyen. La partie inférieure de la séquence suivante de Kaskaskia est représentée par des dolomies et des dololaminites intertidales de couleur vive, silteuses et sableuses, à polygones de dessication, du Groupe de Delorme, y compris les formations de Peel et de Tatsieta, qui passent vers le haut à des dolomies propres, modérément fossilifères, d'eau peu profonde, de la Formation d'Arnica, à des packstones non fossilifères en boulettes de milieu marin peu profond à circulation quelque peu restreinte de la Formation de Landry, et enfin à des calcaires fossilifères argileux très distinctifs à texture de wackestone de la Formation de Hume, qui se sont déposés en milieu marin à circulation libre et qui témoignent d'une diminution de la profondeur marine vers le haut de la séquence. L'unité à la base de cette séquence, le Groupe de Delorme, repose directement sur une discordance bien développée sous le Dévonien qui sépare la Séquence de Kaskaskia de la Séquence de Tippecanoe sous-jacente. Les horizons repères latéralement continus et les marqueurs intraformationnels caractéristiques dans les diagraphies sont bien développés dans la séquence de la plate-forme de Mackenzie–Peel.

Ces séquences de deuxième ordre sont peu développées ou absentes dans le bloc stable du Yukon et les discordances qui les bordent sont plus difficiles à reconnaître. La discordance de l'Ordovicien moyen qui sépare les séquences de Sauk et de Tippecanoe est absente dans cette région et la discordance sous le Dévonien ne s'est formée que sur la hauteur de Dave Lord du côté ouest du bloc stable du Yukon. Par ailleurs, des shales de bassin de la Formation de Road River qui datent de l'Ordovicien moyen au Dévonien basal se rencontrent au sein de la séquence de plate-forme carbonatée partout dans le bloc stable du Yukon. Ces shales n'ont aucune contrepartie dans la séquence de la plate-forme de Mackenzie–Peel. Les horizons repères latéralement continus et les marqueurs caractéristiques dans les diagraphies ne sont pas bien développés dans les couches du Paléozoïque inférieur du Yukon septentrional.

Ces énormes différences lithostratigraphiques indiquent qu'il faudrait élaborer des nomenclatures stratigraphiques différentes pour ces régions. Ainsi, il est juste d'utiliser les formations de Michelle et d'Ogilvie pour le Yukon septentrional. Les formations de Peel, de Tatsieta, d'Arnica, de Landry et de Hume sont limitées à des régions situées à l'est des monts Richardson et du chaînon Knorr. Le nom de «Formation de Bouvette» est donné à une séquence de roches carbonatées d'eau peu profonde de 500 à 1000 m d'épaisseur qui avait été désignée lors de l'Opération Porcupine comme l'unité cartographique ЄDb. La partie inférieure de cette unité remonte à peu près à la même époque que le Groupe de Ronning, mais la Formation de Bouvette comporte aussi des séquences isolées de plate-forme carbonatée datant du Silurien au Dévonien précoce, comme la plate-forme de Royal Mountain dans la région de la cuvette de Blackstone. Une autre nouvelle formation, la Formation de Mount Dewdney, comporte de minces lits de dolomies intertidales silteuses et sableuses, à couleur d'altération jaune et orangée et à polygones de dessication, qui reposent en discordance sur la Formation de Bouvette dans la région de la hauteur de Dave Lord du côté ouest du bloc stable du Yukon.

La Formation d'Ogilvie s'est accumulée pendant une transgression marine continue qui a duré de l'Emsien à l'Eifelien après le développement de conditions donnant lieu à des hauts-fonds à la fin du dépôt de la Formation de Michelle. Au début, l'accumulation de la Formation d'Ogilvie a eu lieu dans un milieu de plate-forme carbonatée au robuste faciès à stromatoporoïdés de bordure de plate-forme. Des dolomies à fenestrae se sont accumulées derrière cette bordure dans un milieu lagunaire à circulation restreinte. Par la suite, la Formation d'Ogilvie s'est déposée sur une rampe carbonatée ne présentant aucune rupture de pente ou une rupture à peine perceptible à la marge de la plate-forme. Du fait de cette transgression, il y a eu progression des dépôts de bassin vers l'intérieur de la plate-forme d'Ogilvie et chevauchement des roches de plate-forme carbonatée d'eau moins profonde. Le dépôt de la Formation d'Ogilvie s'est fait plus par aggradation lors de baisses du niveau de la mer de troisième ordre qui ont entraîné des régressions sur la plate-forme de Mackenzie–Peel.

Les formations d'Ogilvie et de Bouvette sont les unités les plus prometteuses pour les réservoirs d'hydrocarbures de la plaine d'Eagle. Le fait que la matière organique des lits de shales formateurs de pétrole des formations de Canol et de Road River ait atteint sa maturité au Paléozoïque tardif implique que le piégeage des hydrocarbures a été plus efficace dans les pièges antérieurs à la phase laramienne que dans les pièges postérieurs à cette phase. Au moins trois types de pièges pré-laramiens auraient pu retenir des hydrocarbures. Le premier est de nature structurale, associé à des anticlinaux pré-laramiens à longue longueur d'ondes; le deuxième est de nature stratigraphique et est attribuable à la transition roches carbonatées à shales sur les flancs des cuvettes de Richardson et de Blackstone; le troisième, de type diagénétique, s'explique par une fracturation et une dolomitisation des calcaires de la Formation d'Ogilvie au Paléozoïque tardif.

INTRODUCTION

Geographic setting, access, logistics and data acquisition

The study area embraces a wide variety of physiographic regions, ranging from mountainous to nearly flat. Regions with high relief include the Richardson, Ogilvie, Wernecke and Mackenzie mountains (Fig. 1). Porcupine and Peel plateaux and the Eagle Plain form broad lowlands between these mountain belts. The most rugged topography is toward the southeast in the Wernecke and Mackenzie mountains where maximum relief is more than 1000 m and some mountain summits reach 2100 m above sea level. However, the maximum elevation throughout the Wernecke and the northern part of the Mackenzie mountains is generally about 1600 m. The southern and eastern parts of the Ogilvie, and the Wernecke Mountains have similar maximum elevations and relief. However, the western part of the Ogilvie Mountains, particularly the Nahoni Range, are more subdued than their counterparts to the east. Maximum elevation throughout most of the Ogilvie Mountains commonly does not exceed 1500 m.

The Richardson Mountains form a narrow, rather linear, north-trending range of low mountains that separates two major lowlands. Eagle Plain borders the west side of the Richardson Mountains and Peel Plain the eastern side (Fig. 1). Maximum elevations along the Richardson Mountains are about 1350 m and topographic relief is generally less than 500 m. Eagle Plain, in the central part of the study area, has a mean elevation of about 450 to 500 m, whereas the Peel and Anderson plains farther east have somewhat lower mean elevations and slope gently northeastward and northward away from the Richardson and Mackenzie mountains (Fig. 1).

The major drainage of the region is via Peel River and its tributaries, including the Ogilvie, Hart, Bonnet Plume and Snake rivers (Fig. 1) south of Eagle Plain and the Richardson Mountains. Wind and Blackstone rivers (not shown in Fig. 1), extend northward subparallel to, and immediately east of, the Bonnet Plume and Hart rivers, respectively, and are also important tributaries of Peel River. Northwest of the Peel River drainage system, the northward-flowing Porcupine River and its tributaries cross the northeastern part of Eagle Plain. The northward-flowing Arctic Red River and

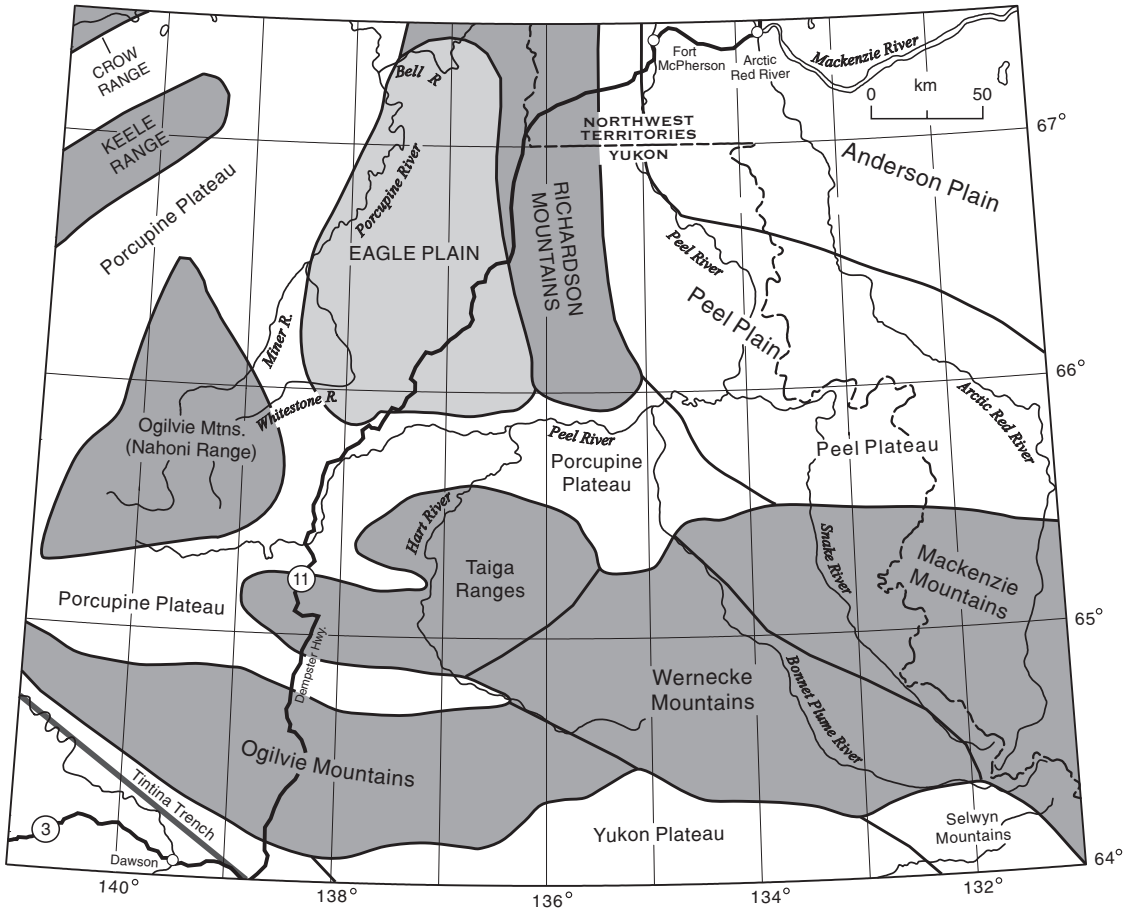


Figure 1. *Major physiographic subdivisions within the study area (after Bostock, 1970). Mountainous regions are shaded. The Dempster Highway (11) extends southwest to northeast and provides the main access route across northern Yukon Territory.*

its tributaries drain the Anderson and Peel plains toward the junction of Arctic Red and Mackenzie rivers at the town of Arctic Red River (Fig. 1). The large river systems of the Arctic Red and the Peel rivers are separated by a continuous drainage divide that coincides with the boundary between the Yukon and Northwest Territories northward up to 67°N latitude.

Stunted trees, mainly black spruce, of the northern boreal forest cover most of the lower elevations, in the study region. Tundra grasses and other alpine vegetation occupy the higher elevations, particularly in the northern parts of the area. Grizzly bears roam the mountainous regions of the study area, whereas black bears occupy the lower elevations and the plains. Caribou, moose, dall sheep and mountain goats were all observed even at high elevations.

The Dempster Highway (Fig. 1) traverses the region and provides the main road access. The city of Dawson near the southern terminus of the Dempster Highway is the main supply centre for operations along or near the Dempster Highway. There are no permanent settlements along the Dempster between its southern junction with the Alaska Highway (Highway 3 in Fig. 1) and the town of Fort McPherson east of the Richardson Mountains (Fig. 1). There is a motel with a small store, open year-round, at the southeastern edge of Eagle Plain. Vehicle maintenance can be done there and gasoline, diesel and aviation fuel are available. The southern map areas of the study region (Hart River - 116H, Larsen Creek - 116A, Nash Creek -106D and Nadaleen River -106C) are more accessible by air from the town of Mayo, south of the Nash Creek map area (106D; Fig. 1). Map areas in the Wernecke and the northern Mackenzie mountains are more accessible by air from Norman Wells to the east.

Data from examining, measuring and sampling stratigraphic sections, was obtained during the summers of 1982, 1984, 1985, 1986 and 1988. Operational base camp in 1982 was at the south end of Margaret Lake, in the Wind River map area (106E), immediately southeast of the junction of Knorr Creek and the Bonnet Plume River. The town of Norman Wells (NWT) was the supply base for this camp. In 1984 and 1985 field operations were conducted from two-person fly camps in the Hart River (116H), Larsen Creek (116A), Nash Creek (106D) and Nadaleen River (106C) map areas, using the town of Mayo (YT) as a supply base. In 1986, field base camp was established by a small stream at milepost 106 on the west side of the Dempster Highway, and supplies were obtained from the city of Dawson.

In 1988, lower Paleozoic strata exposed in the region of the White Mountains in the Bell River map area (116P) just north of the northern edge of the main study area (Fig. 1, 2) were examined. This was done because the White Mountains contain an inlier of exposed lower Paleozoic carbonate strata that closely resemble correlative strata mapped farther south in the study area (e.g., Norris, 1985; Norford, 1964). Fieldwork in this area was done by fly camps out of a base camp at Shingle Point on the north coast of the Yukon Territory. Supply base for the Shingle Point base camp was the town of Inuvik (NWT).

Subsurface data for the lower Paleozoic were assembled and examined at the Calgary office of the Geological Survey of Canada from 1990 to 1995. Much of this data was obtained from the in-house SWELLS database and also from well history reports and the examination of selected well cores from Eagle Plain, Porcupine Plateau, and Anderson and Peel plains.

Previous work

The series of geological maps and accompanying structural cross-sections that resulted from Operation Porcupine, a Geological Survey of Canada mapping program conducted during the mid to late 1960s, provided the foundation for studies concerning almost all lower Paleozoic strata in the study region. Operation Porcupine covered the area north of 65°N and west of 132°W in the present study area[1]. Norris, (1985a; Map 1581A) is a useful summary map that covers the entire Operation Porcupine area. The southern edge of this area is bordered by the three map areas of Dawson (Map 1284A), Larsen Creek (Map 1283A) and Nash Creek (Map 1282A), which are all included in Green (1972). These last named maps comprise, almost entirely, numbered, unnamed map units. It is possible, however, to discern their formational equivalents in the Operation Porcupine map series by comparing the map units along their shared map boundaries.

Other geological maps in the southeastern part of the study area with significant exposures of lower Paleozoic strata include Upper Ramparts River (106G), map 1452A in Aitken et al. (1982) and the Bonnet Plume (106B) and Nadaleen River (106C) map areas in Blusson (1974). The Ontaratue River (1408A) and Travaillant Lake (1409A) map

[1]Operation Porcupine geological maps in this area include Norris, 1981a (Map 1522A -Porcupine River), 1981b (Map 1523A - Eagle River), 1981c (Map 1524A - Trail River), 1981d (Map 1525A - Martin House), 1981e (Map 1518A - Old Crow), 1981f (Map 1519A - Bell River), 1981g (Map 1520A - Fort McPherson), and 1981h (Map 1521A - Arctic Red River), 1982a (Map 1526A - Ogilvie River), 1982b (Map 1527A - Hart River), 1982c (Map 1528A - Wind River), 1982d (Map 1529A - Snake River).

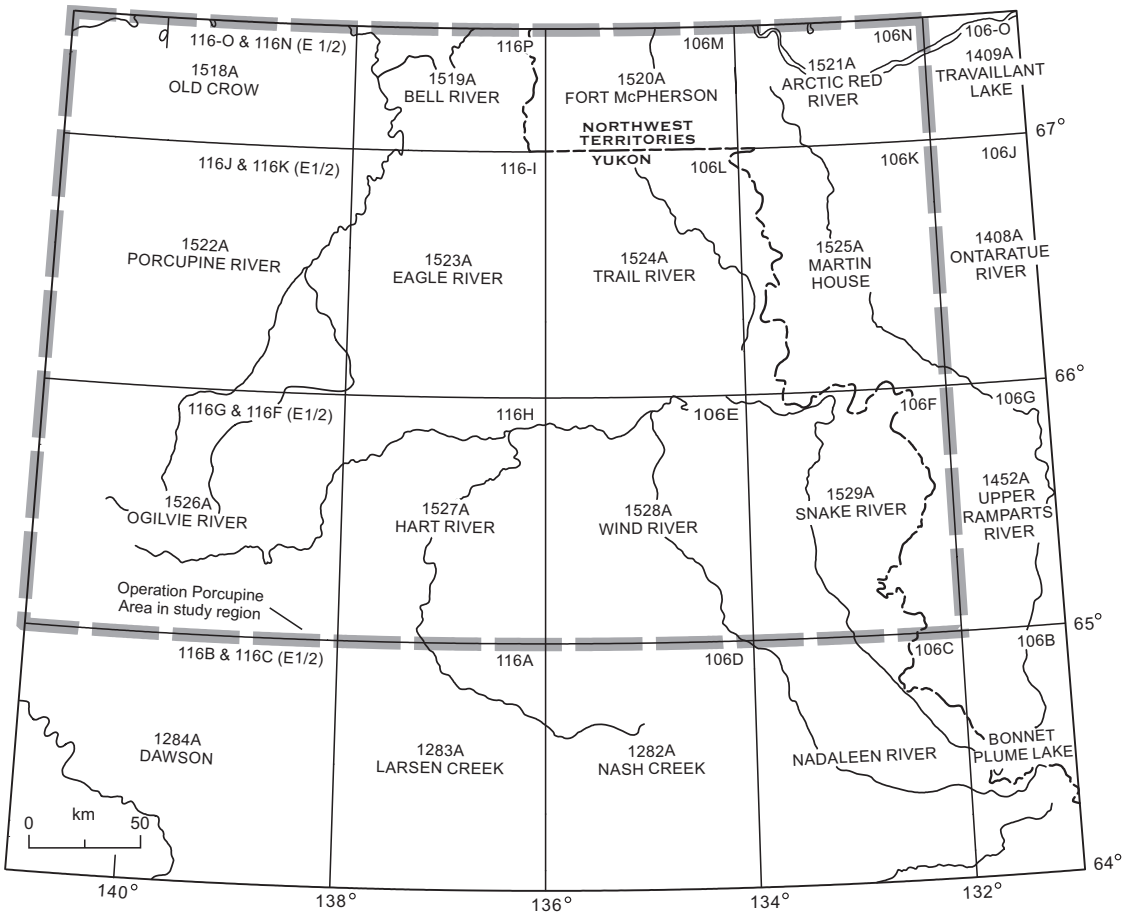


Figure 2. *Study area showing National Topographic Series map identifiers for 1:250 000-scale topographic maps and the corresponding Geological Survey of Canada A-series maps. The Nadaleen River (NTS 106C) and Bonnet Plume Lake (NTS 106B) map areas have no corresponding A-series maps. Also shown is the area covered by Operation Porcupine (Norris, 1997), which falls within the study area.*

areas, which are included and described in Cook and Aitken (1975), border the northeastern part of the study area.

The geological maps of Operation Porcupine, and those that border the Operation Porcupine area to the south, cover a region that coincides with a broad area of early Paleozoic platformal carbonate deposition termed the Yukon Stable Block and also with the region of the Richardson Trough, which was the site of basinal shale deposition throughout the early Paleozoic (Norris, 1985; Pugh, 1983; Fig. 2, 3). The other map areas cited above, in the southeastern part of the study area, fall outside these paleogeographic regions, and instead are part of the Mackenzie–Peel Shelf and the accompanying Misty Creek Embayment (Cecile, 1982).

There are no publications that deal specifically with the lower Paleozoic lithostratigraphy of this entire region or that treat both surface and subsurface lower Paleozoic stratigraphy together. This has impeded the development of a consistent stratigraphic nomenclature for lower Paleozoic strata across the study region. The extreme divergences between the most recently published surface and subsurface lithostratigraphic nomenclatures, which were presented in regional stratigraphic studies (Norris, 1985; Pugh, 1983), and between the nomenclature utilized in the 1:250,000-scale surface geological maps of Operation Porcupine (Norris, 1981a, b, c, d, e, f, g, h; Norris, 1982a, b, c, d) are illustrated in the charts of stratigraphic nomenclatures presented in Figures 4 and 5. It is apparent that there is little consistency between these nomenclatures.

The few, earlier regional stratigraphic and geological mapping studies within the area include Norris, (1967; 1968a, b), Brabb (1967), Brabb and Churkin (1967), and Martin (1973). Brabb (1967) and Brabb and Churkin (1967) named and provided stratigraphic information for lower Paleozoic units in eastern Alaska adjacent to the western boundary of the study area. Some of these units (Jones Ridge Limestone, McCann Hill Chert) extend into the study area (Norris, 1982a). Perhaps the earliest geological report to

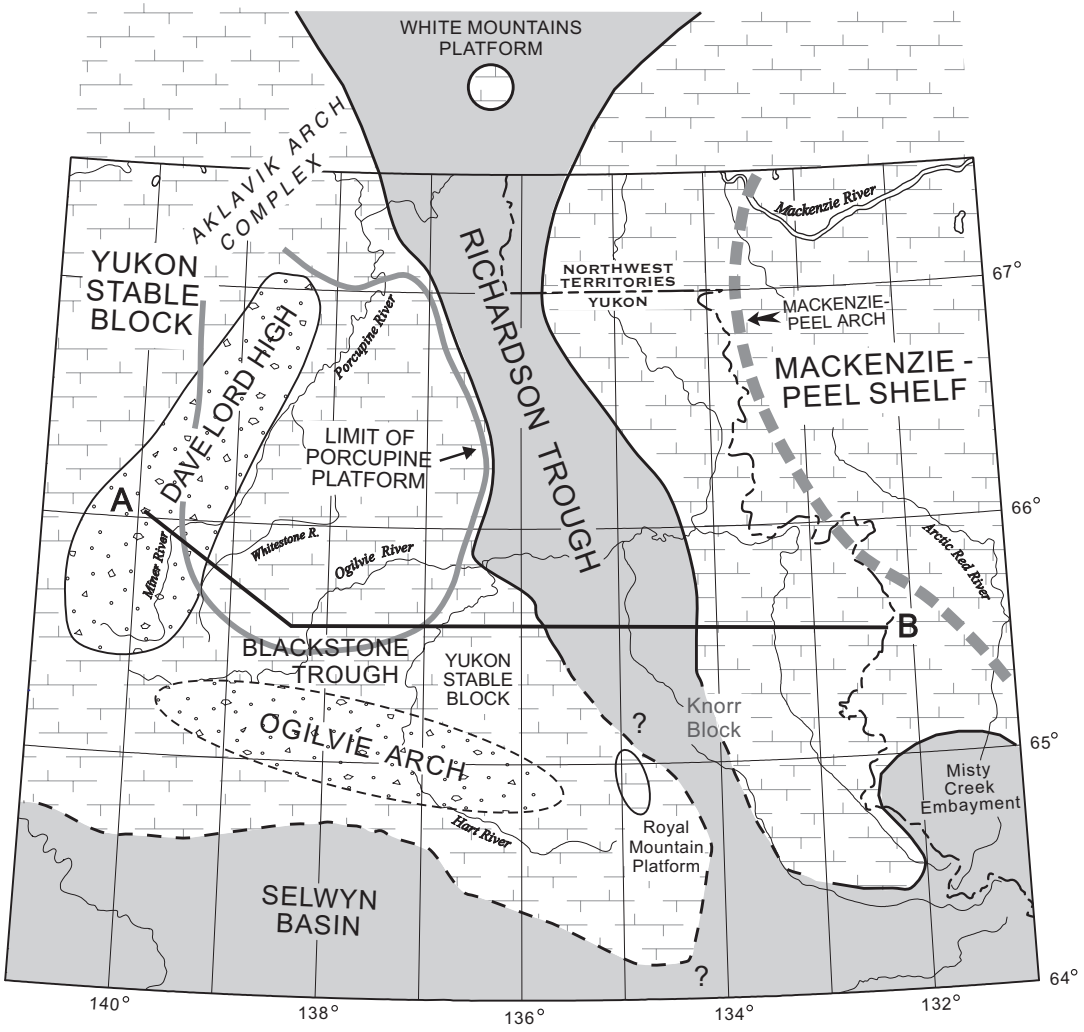


Figure 3. *Major paleogeographic elements that influenced sedimentation in early Paleozoic time (after Norris, 1985; Pugh, 1983). Areas of predominantly shallow-water carbonate deposits are shaded. Unshaded regions are dominantly basinal shale deposits. Also shown is the line of section for the lithostratigraphic correlation charts shown in Figures 4 and 5 (Line A–B).*

cover part of this area is McConnell (1891), followed by Cairnes (1914). After these reports there was very little other published lithostratigraphic or geological mapping work done before the beginning of Operation Porcupine, although private companies, such as the Peel Plateau Exploration Company Ltd., did geological studies of the Eagle Plain area (A.W. Norris, pers. comm.). The lithostratigraphic studies of Norris (1967; 1968a, b) and Norford (1964) were done as part of Operation Porcupine. A recent compilation incorporating almost all previous work connected with Operation Porcupine is contained in Norris (1997b).

There is also a large number of much more site-specific biostratigraphic and paleontological studies done in the study area. Many of these are discussed in Norris (1985). Some of the more significant studies of faunas and their age determinations for specific lithostratigraphic units include Jackson and Lenz (1962, 1969) and Lenz and Jackson (1971) concerning graptolite faunas of the Road River Formation at Royal Creek in the Wind River map area (106E); Lenz (1966, 1968, 1988) for brachiopods and graptolites, and McCracken and Lenz (1987) for conodonts and graptolites in the Road River Formation; Stearn and Mehrota (1970) for stromatoporoids in the Hume, Ogilvie and Michelle formations; Ormiston (1971) for trilobites from the Michelle Formation in the Ogilvie and Hart River areas; Fåhraeus (1971) for conodonts from the Michelle Formation; Ludvigsen (1970, 1972) for tentaculitids and conodonts of the Michelle and Road River formations; Perry et al. (1974) for brachiopods, corals, conodonts and trilobites of the Ogilvie Formation; Berdan and Copeland (1973) for ostracodes from the McCann Hill Chert and from the Michelle Formation; and Copeland (1977) for ostracodes from the Royal Creek area. All of these reports are based upon samples obtained from outcrop exposures primarily during Operation Porcupine. Norford et al. (1970, 1971) are

the only biostratigraphic reports concerning lower Paleozoic faunas from the subsurface of the study area.

There have been a number of regional biostratigraphic and paleogeographic syntheses concerning the lower Paleozoic that cover the study area. Lenz (1972) presented a useful summary of the early Paleozoic of this area. Chatterton (1978) summarized conodont biostratigraphy and its relationship to lithostratigraphy for all of northwestern Canada. Braun (1978) summarized the biostratigraphy of ostracodes for all of western Canada. Older regional syntheses of the Devonian System of northwestern Canada, such as Bassett and Stout (1968) and Norris (1968a, b) have been superseded by more recent syntheses (Morrow and Geldsetzer, 1988; 1992; Moore, 1988). Cecile and Norford (1992) presented a synthesis of the Ordovician and Silurian systems for western and northern Canada. Some authors have attempted to reconstruct sea-level changes for parts of northwestern Canada (Lenz, 1982; Johnson et al., 1985).

There have been very few studies that have attempted to add sedimentological information to the existing litho-stratigraphic and biostratigraphic database of the study area. Dubord et al. (1986) and Clough and Blodgett (1984) are the most notable in this respect.

Organic maturation of these strata and its relationship to petroleum potential has been discussed by Link and Bustin (1989) and by Link et al. (1989). Snowdon (1987) presented Rock-Eval information for a number of wells in the Eagle Plain Basin and described their petroleum potential.

Objectives and database

The primary purpose of this study is to provide a more detailed lithostratigraphic characterization of lower Paleozoic strata and to make observations concerning sedimentary structures and diagenesis within these strata. Particular emphasis has been placed upon the Devonian Ogilvie and Michelle formations because they are largely undolomitized and original sedimentary fabrics have been preserved. The Ogilvie Formation is also the most prospective lower Paleozoic unit in terms of commercial hydrocarbon accumulations since it is overlain directly by organic-rich shale source beds of the Canol Formation. Lithostratigraphic data are utilized to reconstruct the early Paleozoic geological history within the study area and to identify major episodes of sedimentation that occurred in response to changes in sea level. The timing of major shifts in sedimentation and inferred sea-level changes have then been compared with published reconstructions of early Paleozoic eustatic sea-level changes. This study is based upon data from 57 outcrop sections (Fig. 6; Appendices 1, 5; Table 1), 37 subsurface well sections of lower Paleozoic strata (Fig. 6; Appendices 2–4; Table 2), additional paleontological (Appendix 6) and seismic data, as well as information obtained from some of the 44 other wells drilled in the study area (Fig. 7; Appendix 2).

Table 1
Outcrop section numbers, names and locations

Section number	Section field name	Latitude	Longitude
1	MTA-82-7	64.4297	132.8481
2	MTA-85-1	64.5250	134.9500
3	MTA-84-11	64.5833	135.2917
4	MTA-86-5	64.6250	139.1833
5	MTA-82-17	64.6500	132.7833
6	MTA-84-12	64.7917	135.3697
7	MTA-86-25	64.8750	139.5333
8	MTA-82-1	65.0417	135.0833
9	MTA-82-13	65.0547	135.1542
10	MTA-86-P1	65.0583	138.5667
11	MTA-86-15	65.0750	136.2500
12	MTA-86-8	65.0917	138.4000
13	MTA-82-2	65.1222	135.6667
14	MTA-82-16	65.1283	136.6483
15	MTA-86-4	65.1667	137.7167
16	MTA-82-15	65.1889	136.2500
17	MTA-85-2	65.1917	136.6667
18	MTA-86-10	65.2000	139.0583
19	MTA-82-6	65.2167	132.2667
20	MTA-86-21	65.2250	137.9333
21	MTA-86-28	65.2750	140.9167
22	MTA-82-5	65.3750	134.1667
23	MTA-82-14	65.3833	136.2167
24	MTA-86-7	65.3833	138.2417
25	MTA-86-12	65.3917	140.3000
26	MTA-86-P2	65.4000	140.1000
27	MTA-82-11	65.4122	131.8178
28	MTA-84-8	65.4167	137.0500
29	MTA-84-9	65.4333	136.9667
30	MTA-82-4	65.4500	133.8833
31	MTA-86-19	65.4500	139.4167
32	MTA-82-8	65.4528	133.5833
33	MTA-86-22	65.4542	140.7917
34	MTA-84-10	65.4583	136.9500
35	MTA-86-3	65.4583	137.2667
36	MTA-86-11	65.4583	139.4583
37	MTA-86-9	65.4667	138.2250
38	MTA-86-1	65.4833	137.9583
39	MTA-86-6	65.3667	138.4583
40	MTA-86-13	65.4833	139.1500
41	MTA-82-3	65.5083	133.0500
42	MTA-86-2	65.5167	137.6917
43	MTA-86-14	65.5583	138.7833
44	MTA-82-9	65.5744	132.7761
45	MTA-82-10	65.5767	135.1875
46	MTA-86-P4	65.5958	140.5667
47	MTA-84-4	65.6333	136.7250

Table 1 cont.
Outcrop section numbers, names and locations

48	MTA-84-3	65.6500	136.7667
49	MTA-84-5	65.6500	136.8083
50	MTA-84-2	65.6667	137.2000
51	MTA-84-6	65.6711	136.8542
52	MTA-84-7	65.6814	137.0114
53	MTA-84-1	65.6833	137.4333
54	MTA-86-26	65.6917	139.6000
55	MTA-86-16	66.0167	139.6000
56	MTA-86-17	66.0500	139.5917
57	MTA-82-12	66.4122	135.4767

A second objective of this study is the reconciliation of the discrepancies between the lower Paleozoic stratigraphic nomenclatures adopted in recent stratigraphic studies (Norris, 1985; Pugh, 1983) and the stratigraphic nomenclature employed in bedrock geology maps (Norris, 1981a, b, c, d, e, f, h, 1982a, b, c, d; Fig. 4, 5). The continued existence of these discrepancies can only lead to difficulties for future work regarding lower Paleozoic strata. The stratigraphic nomenclature adopted in this study is summarized in Figure 5.

The names of formal stratigraphic units previously regarded as obsolete, such as “Gossage” or “Gossage

Table 2
Wells penetrating lower Paleozoic carbonates in study region

Well name	Unique well ID	Latitude	Longitude
Aquitaine Alder YT C-33	300C336600136450	65.8671	136.9194
Skeelly-Getty Mobil Arctic Red C-60	300C606650133450	66.8167	133.9219
Shell Arctic Red River O-27	300O276650132450	66.7822	132.8266
Shell Arctic Red West G-55	300G556650133000	66.7412	133.1662
Inc Nco Mobil Attoe Lake I-06	300I066730133150	67.4250	133.2528
Sobc Blackstone YT D-77	300D776550137000	65.7697	137.2486
Gulf Mobil Caribou YT N-25	300N256620134450	66.2461	134.8344
IOE Clare F-79	300F796710133000	67.1389	133.2389
Amoco PCP A-1 Cranswick A-22	300A226540131450	65.5169	131.8153
Amoco PCP B-1 Cranswick YT A-42	300A426550133000	65.6868	133.1311
Peel Plateau Eagle Plains YT #1 N-49	300N496650138000	66.8150	138.1417
IOE Martin House L-50	300L506650133150	66.8283	133.4008
Union Amoco McPherson B-25	300B256720135300	67.2336	135.5729
Socony Mobil-WM N Cathedral YT B-62	300B626620138300	66.1871	138.6981
IOE Nevejo M-05	300M056720134000	67.2494	134.0292
Western Minerals North Hope YT N-53	300N536640138150	66.5483	138.4250
Chevron Sobc Wm North Parkin YT D-61	300D616630137000	66.3367	137.2169
Atlantic et al. Ontaratue H-34	300H346630132000	66.3896	132.0976
Decal Tran Ocean GCOA Ontaratue I-38	300I386620131450	66.2944	131.8500
Pacific et al. Peel YT F-37	300F376700134450	66.9406	134.8650
Mobil Gulf Peel H-71	300H716630134300	66.3411	134.7261
Shell Peel River YT I-21	300I216620134150	66.1768	134.3142
Shell Peel River YT M-69	300M696610133450	66.1489	133.9678
Inexco Husky et al. Porcupine YT G-31	300G316630140000	66.3394	140.1036
Arco Shell Sainville River D-08	300D086620133300	66.2853	133.5275
IOE Satah River YT G-72	300G726700134000	66.8578	134.2325
SOBC WM Shaeffer Creek YT O-22	300O226650137150	66.6983	137.3278
Dome Texaco Imo South Peel D-64	300D646600132150	65.8844	132.4639
Socony Mobil-Wm South Tuttle YT N-05	300N056630136450	66.4142	136.7730
IOE Stony I-50	300I506730135150	67.4956	135.3794
IOE Swan Lake K-28	300K286710133300	67.1283	133.5789
MCD GCO Northrup Taylor Lake YT K-15	300K156600133000	65.9108	133.0500
Shell Trail River YT H-37	300H376640134450	66.6044	134.8497
Shell Tree River EastH-57	300H576710132150	67.1075	132.4112
Shell Tree River F-57	300F576710132150	67.1076	132.4279
IOE Tree River H-38	300H386720132150	67.2892	132.3500
Inexco et al. Weldon Creek O-65	300O656610132150	66.0792	132.4503

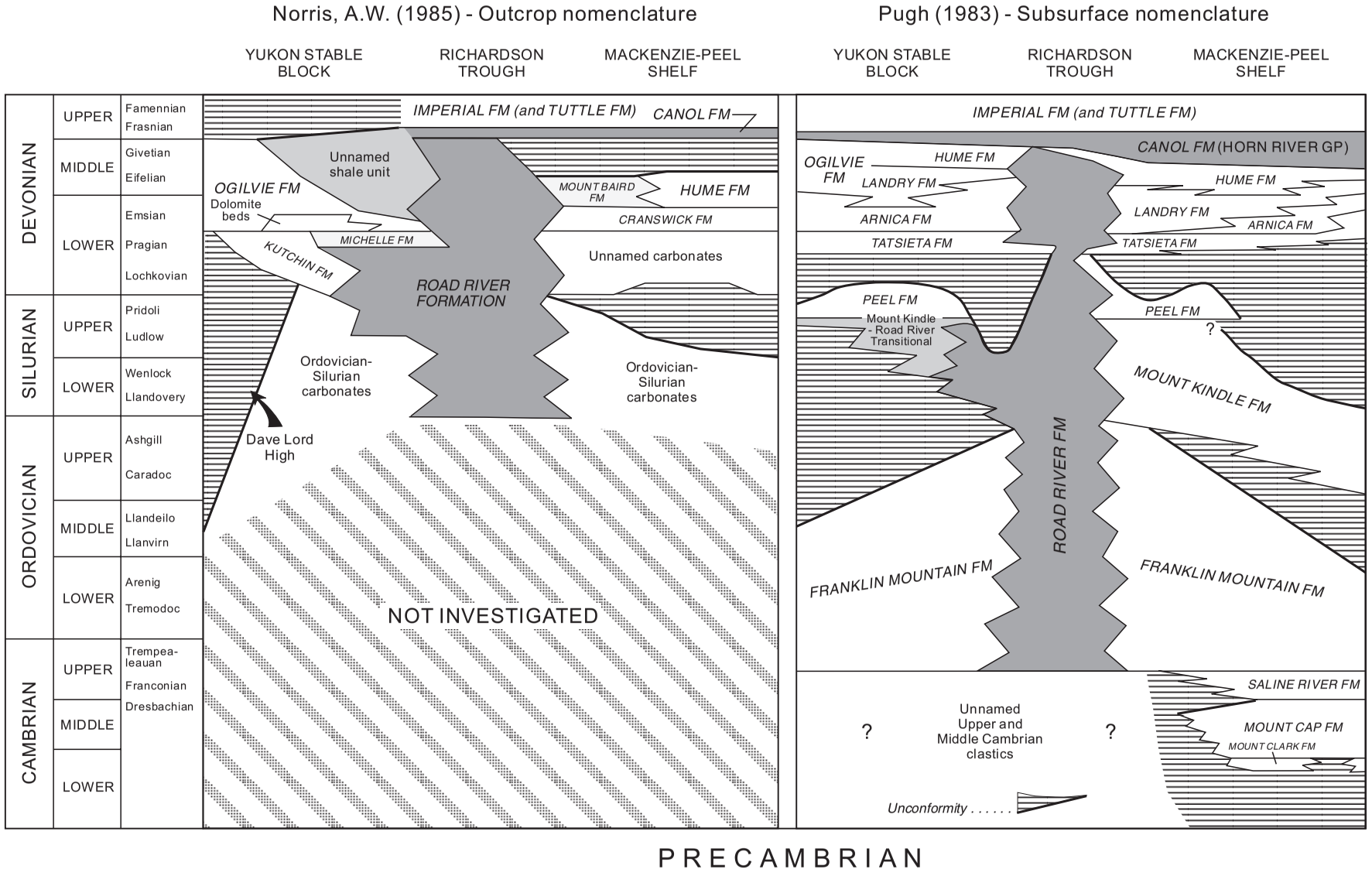


Figure 4. *Correlation charts showing the stratigraphic nomenclature of Norris (1985) and Pugh (1983) (see Fig. 3). The nomenclature of Norris (1985) is based on surface geology, whereas the nomenclature of Pugh (1983) is based on subsurface geology. Note the major unconformity beneath the Tatsieta Formation and the extension westward of the stratigraphic nomenclature from the Mackenzie–Peel Shelf into the northern Yukon Territory (Pugh, 1983). Dark shading represents siliciclastics whereas absence of pattern indicates carbonate. Darkness of shading is proportional to darkness of siliciclastic units.*

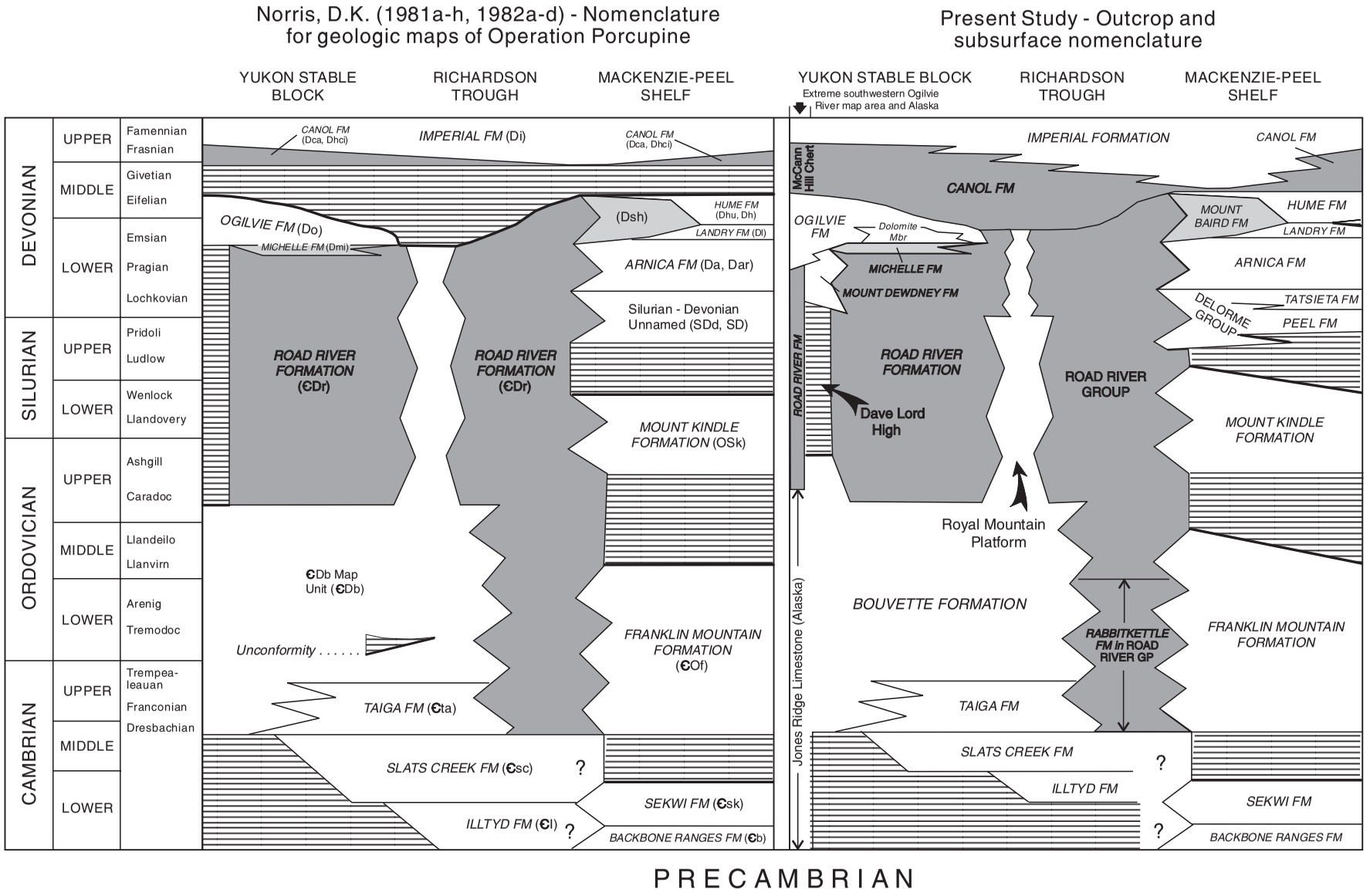


Figure 5. *Correlation charts showing the stratigraphic nomenclature of Norris (1981a-h, 1982 a-d) and the nomenclature adopted in this study along the line of section A-B in Figure 3. Note that in both of these charts a major change in stratigraphic nomenclature occurs across Richardson Trough. The Royal Mountain Platform, formed of Bouvette Formation strata (i.e., the CDb map unit of Norris, 1985a), has been projected into the line of section. Shading of units follows that of Figure 4.*

Formation", are placed within double quotation marks in the text if these units are also regarded as obsolete in this study. Formal stratigraphic units, such as the "Kutchin Formation", previously considered to be valid lithostratigraphic units, but considered invalid in this study, are also placed within double quotation marks. Formal stratigraphic units used in different, albeit not greatly different, ways are not identified where they are cited, except to also cite the author who used them in instances where this is pertinent. Definitions of units of this type have not undergone any substantial change, or only minor changes in this study (e.g., Ronning Group).

A final category for the use of stratigraphic nomenclature in this study applies to stratigraphic units named in reports that do not completely satisfy the requirements for publication of formal stratigraphic units (Oriel, 1983). These units are uncapitalized, and are cited as informal units commonly in conjunction with their source reference. Examples of this type of usage are the subdivisions of the Road River in its type area (Cecile et al., 1982; Link et al., 1989; Cecile, pers. comm.). Reference to these units in this publication is not intended to provide formal status for these units.

Organic maturation data have been gathered and some revisions made to previous estimates of the degree of organic maturation at the top of the Ogilvie Formation (Link and Bustin, 1989). This data, combined with improved lithostratigraphic information, was used to refine assessments of oil and gas potential in these strata.

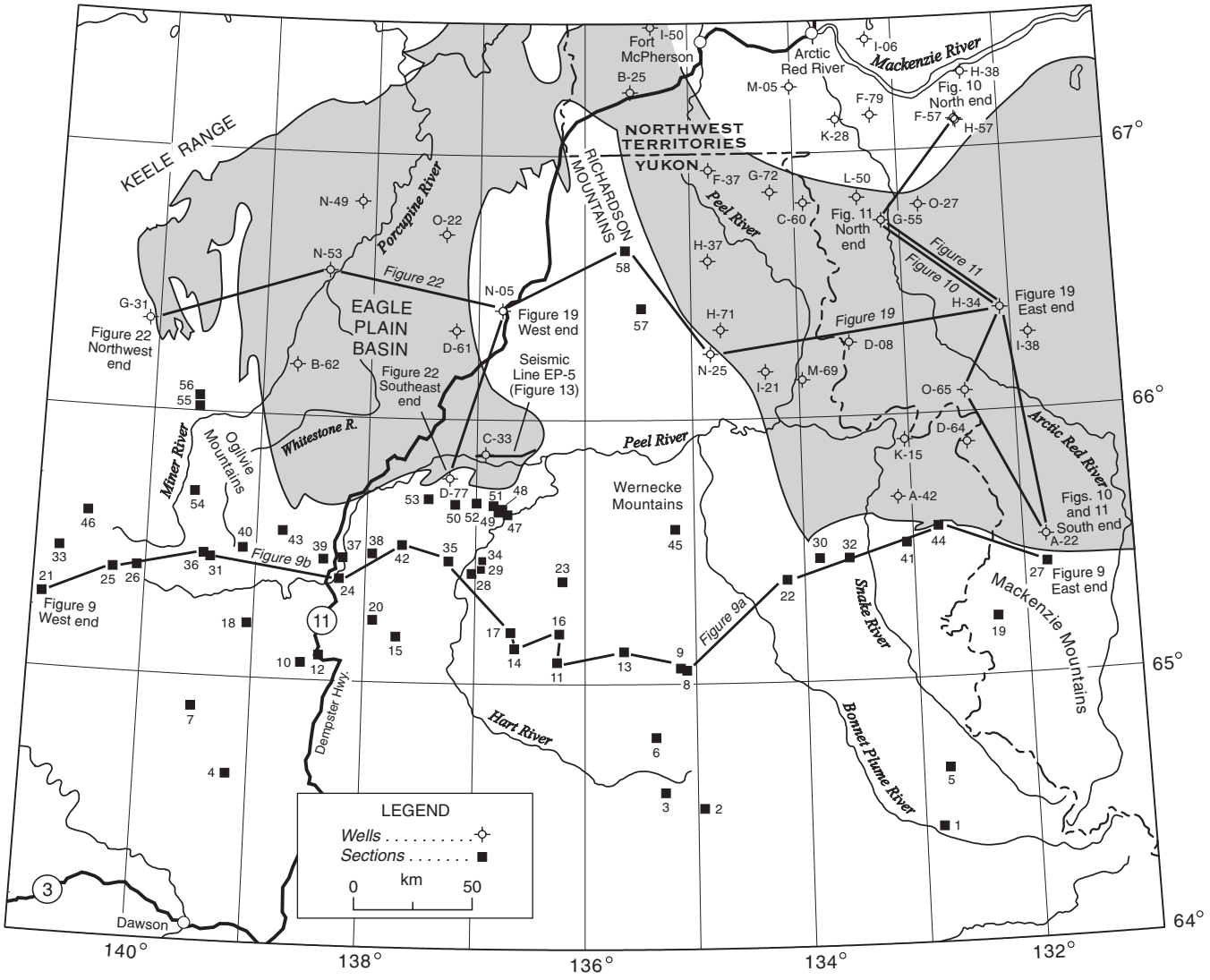


Figure 6. *Index map of study area showing locations of outcrop and subsurface sections of lower Paleozoic strata. Cretaceous cover is shaded in Eagle Plain Basin and across Mackenzie–Peel Shelf east of the Richardson Mountains. The positions of the lines of sections for four stratigraphic cross-sections and one seismic cross-section (Aquitaine Canada EP-5) are also indicated.*

Finally, shales were analyzed for their major and metallic element contents in order to help assess the potential for additional shale-hosted base metal deposits.

Methods

Dunham's (1962) classification was used for the lithological description of carbonate rocks, as augmented by Embry and Klovan (1971). Classification and description of sandstones, siltstones and shales follows Folk (1968). Classification and description of bed thicknesses and bed parting styles follows Ingram (1954) and Kahle and Floyd (1971). Thin section descriptions of carbonate microfacies follows the methods and procedures outlined in Flügel (1982).

X-ray identifications of the mineralogy of forty-four shale samples from the Road River Group and the Canol Formation were performed on a Philips PW1700 automated X-ray powder diffraction system for mineral identification. Samples were scanned using Cobalt Ka radiation.

Determinations of major and metallic element contents of forty-four shale samples from the Road River Group and the Canol Formation were performed on a Philips PW 1400 Mass Spectrometer using a Rhodium tube. Operating procedures and the theory of X-ray fluorescence followed standard methods, in which the powdered sample is dissolved in a flux of lithium tetraborate to form a 'glass bead' suitable for direct analysis (see Adler, 1966).

Conodont alteration indices (CAI) were determined for twenty-three samples from the Ogilvie and Hume formations according to the methods outlined in Epstein et al. (1977) and in Nowlan and Barnes (1987).

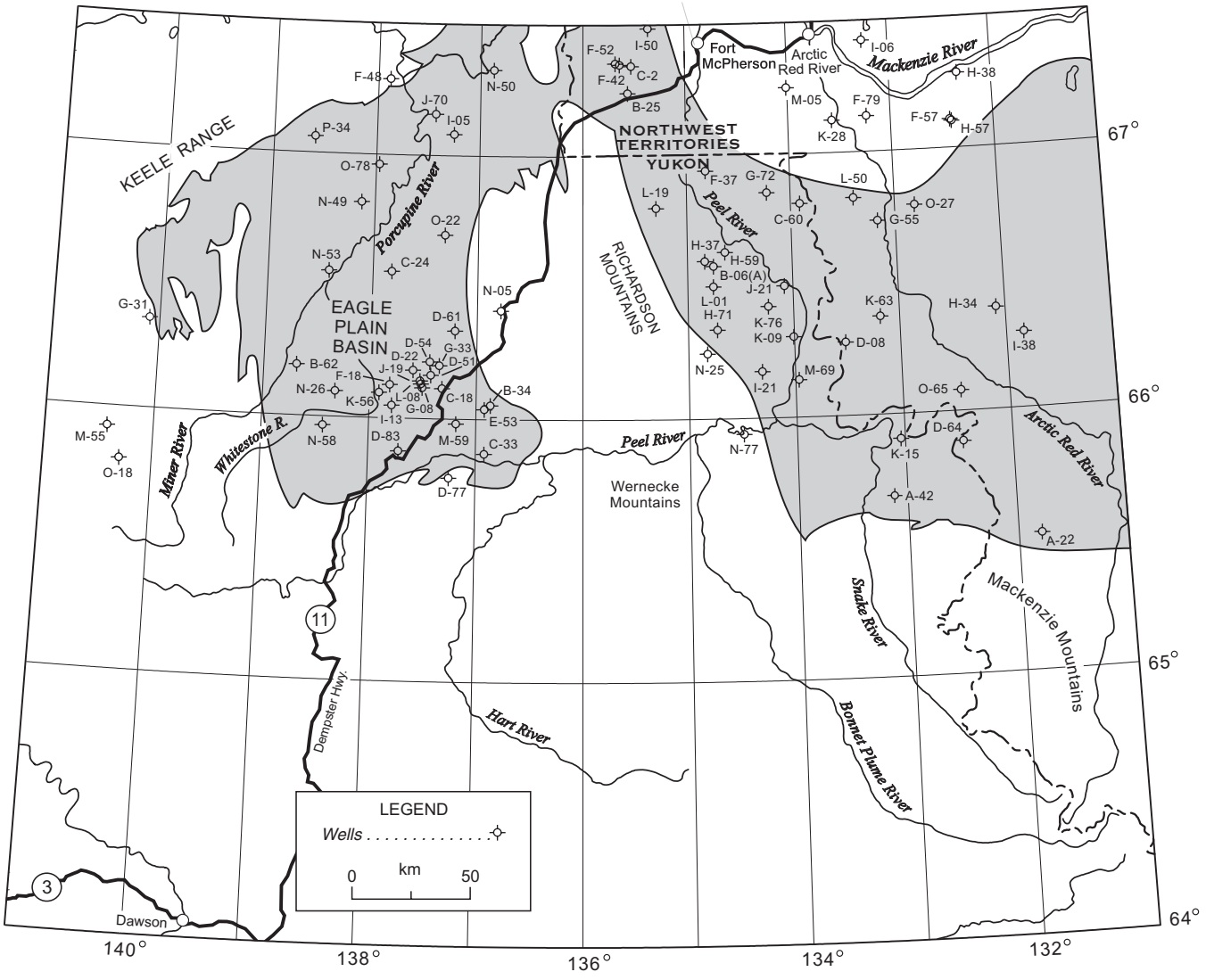


Figure 7. *Index map showing locations of all wells in the study area. Cretaceous cover is shaded.*

Acknowledgments

I would like to thank M. Dittriech, L. Haid and M. Bergeron for their able and willing field assistance during the summers of 1982, 1986 and 1988, respectively. K. Nairn, D. Lepard and G. Lai provided invaluable assistance with respect to the SWELLS database and other computer-related problems. Additional paleontological data for selected faunas were provided by A. Pedder and G. Nowlan and I extend my appreciation to them. As camp colleagues, Bob Thompson and Grant Abbot provided useful insights into the geology of map areas south of the Operation Porcupine area. Al Heinrich, Bob Davidson, Brad Gorham and Jenny Wong performed all mineralogical and geochemical analyses.

I wish to thank the critical readers of this bulletin, Tim de Freitas and A.W. (Willy) Norris for their patient, although undoubtedly at times irascible, reading of the manuscript, which their comments and suggestions significantly improved. Lastly, I would like to thank Marc Dubord for his invaluable help in the field and for his insightful sedimentological analysis of the Ogilvie Formation.

REGIONAL GEOLOGICAL SETTING

The plains (Peel, Anderson and Eagle plains) within the study area are mantled by flat-lying to gently dipping Cretaceous strata whereas the mountain belts (Mackenzie Mountains, Wernecke Mountains, Taiga Ranges, Ogilvie Mountains, Richardson Mountains and Keele Range) are formed largely of elevated, folded and faulted structural culminations of Precambrian and lower Paleozoic strata (Fig. 8). The Richardson Mountains are coextensive with the

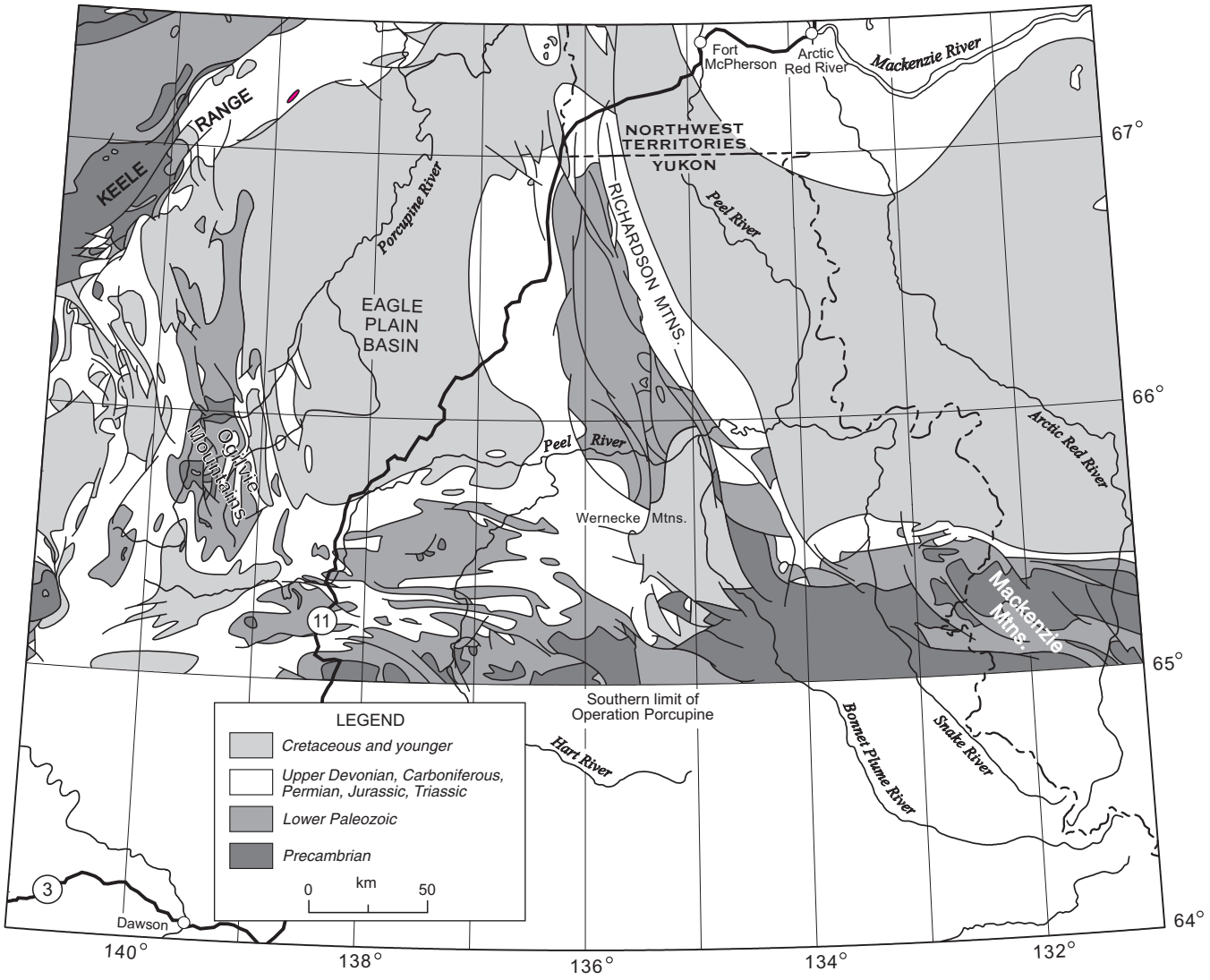


Figure 8. *Distribution of lower Paleozoic strata throughout the study area. Also shown are the distributions of Precambrian, Upper Devonian to Triassic, and Cretaceous and younger strata, as individual aggregate map units. Most of the study area coincides with the region of Operation Porcupine, which has been mapped with a series of mutually consistent 1:250,000-scale maps, the information of which is summarized in map 1581A (Norris, 1985a; scale 1:500,000).*

Richardson Anticlinorium (Norris, 1985b). Porcupine Plateau occupies the intermontane areas west of Peel Plain and is formed of gently dipping to folded upper Paleozoic and Cretaceous strata (Fig. 8) that are less deformed and structurally elevated than in the adjacent mountain belts. The Keele Range (Fig. 1) is part of the northeast-trending Aklavik Arch (Norris, 1985b).

Several of these mountain belts are approximately co-extensive with the foldbelts of Norris (1985b). These include the Mackenzie Foldbelt (Mackenzie and Wernecke Mountains) and the Taiga–Nahoni Foldbelt (Ogilvie Mountains). The Eagle Foldbelt is an exception to this generalization as it embraces the Eagle Plain as well as part of the Ogilvie Mountains. These foldbelts comprise bundles of en-echelon folds that have predictable locations and orientations in which individual anticline–syncline pairs are several kilometres to tens of kilometres in wavelength (Norris, 1985b). These bundles of open and rather symmetrical en-echelon folds are commonly developed in regions where the lower Paleozoic sequence is dominated by carbonates. The folds developed during Laramide-age deformation of the northern Cordillera and form well-defined structural closures suitable for the present-day entrapment of hydrocarbons in the subsurface of Eagle Plain (Norris, 1985b; Dixon, 1992; Martin, 1973). In general, tectonic shortening of the supracrustal sedimentary wedge or prism in the northern Canadian Cordillera has occurred dominantly by folding, rather than by the bedding-plane listric-thrust style of shortening characteristic of the southern Cordillera (Norris, 1985b). One consequence of this is that the total degree of east–west tectonic shortening in the northern Cordillera is only about 10 to 20 per cent in contrast to the 50 per cent of shortening estimated to have occurred in the southern Canadian Cordillera (Gordey, 1981; Norris, 1985b). One consequence of the much smaller amount of westward tectonic transport of the supracrustal wedge in the north is that the Cretaceous–Tertiary foredeep immediately east of the deformation front in the northern Cordillera north of 60°N was less well developed than farther south (Norris, 1985b).

However, up to 2500 m of Mesozoic strata accumulated above the Paleozoic across Eagle Plain (Dixon, 1992). In large part, the sediments that formed these strata were shed northward into a foredeep that developed in front of a northward-expanding Cordilleran Orogen in Early and Late Cretaceous time, along with some sediment contributions from northwesterly source areas, such as the Brooks Range Geanticline, which developed along the northwest margin of the present-day Eagle Plain (Dixon, 1992). This was followed in Tertiary time by the more west-directed compressional tectonics of the Laramide Orogeny.

Eagle Plain is bounded on its east side by the structurally uplifted and folded Richardson Anticlinorium, which is segmented by fault blocks of the Richardson Fault Array (Norris, 1985b). The Aklavik Arch Complex, a broad tectonic feature that extends across the northwest corner of the study area, borders the northwestern part of Eagle Plain. The Complex (Fig. 3) is dominated by faults rather than folds, and lower Paleozoic strata, where preserved, are a mixture of shale and carbonate (Norris, 1985b).

Major paleogeographic elements that have affected early Paleozoic deposition are shown in Figure 3. The north-northwest trending Richardson Trough (Gabrielse, 1967; Norris, 1985; Pugh, 1983) was a region of slope and basinal shale and argillaceous limestone deposition that separated two large regions dominated by deposition of shallow-water carbonates. These broad regions of early Paleozoic shallow-water deposition include the Mackenzie–Peel Shelf (modified from Norris, 1985 and from Morrow and Geldsetzer, 1988) east of Richardson Trough, and the Yukon Stable Block (Lenz, 1972; Norris, 1985) west of the trough. Porcupine Platform was a smaller, semicircular region of shallow-water carbonate deposition that developed across the central part of the Yukon Stable Block during deposition of the Ogilvie Formation (Morrow and Geldsetzer, 1988). The Selwyn Basin (Gabrielse, 1967) was a large region of basinal shale deposition that bordered the southern margin of the Yukon Stable Block. Misty Creek Embayment (Cecile, 1982) was a large embayment of slope and basinal deposits that developed along the western margin of the Mackenzie–Peel Shelf and opened southward into Selwyn Basin. Blackstone Trough (Lenz, 1972) was a region of Late Ordovician to earliest Devonian basinal shale deposition that developed within the south–central part of the Yukon Stable Block (Fig. 3). This negative tectonic element was superimposed on the eastern part of the older Ogilvie Arch and eastward it merges with Richardson Trough.

Ogilvie Arch and the Dave Lord High are positive tectonic elements that can be recognized within the Yukon Stable Block. Ogilvie Arch (Gabrielse, 1967) is a late Precambrian or Proterozoic positive element that bordered the southern margin of the Yukon Stable Block. Little is known about the extent or plan geometry of this feature. It was not recognizable as a distinctly positive element after Late Cambrian time. There is, however, some indication that Ogilvie Arch influenced Early to Middle Cambrian deposition at its eastern end in the middle of the Hart River map area (Map 1527A; Norris, 1982b). The westward erosional truncation of the Lower to Middle Cambrian Illtyd and Slats Creek formations beneath the Bouvette Formation (new formation) (Fig. 5) may reflect the influence of this arch. Also, in several places in the Wind River, Hart River and Ogilvie River map areas, the Bouvette Formation overlies Proterozoic strata with angular unconformity (Norris, 1982a, b, c). It is not clear how much of the pre-Bouvette deformation is Cambrian or Precambrian, but some part of this deformation might have been caused by uplift across Ogilvie Arch. The Dave Lord High (Lenz, 1972) trends subparallel to Porcupine River (Fig. 3) and is defined

primarily by the absence of Upper Ordovician, Silurian and earliest Devonian strata beneath the Ogilvie Formation (Fig. 5; Norris, 1981a, 1982a). There are no readily identifiable erosional truncations of older strata beneath the Devonian System in the region of the Dave Lord High, but there is sedimentological evidence in favour of at least some erosional removal of strata beneath the Devonian at Mount Burgess (Norris, 1985). At this locality, large pockets of rusty-brown weathering chert–pebble conglomerate and breccia are scattered along the top of the Bouvette Formation, which was mapped previously as the ЄDb map unit (e.g., Norris, 1982a). These pods of chert breccia have been interpreted as evidence for post-mid-Ordovician subaerial exposure at the top of the Bouvette Formation prior to Devonian deposition (Norris, 1985).

The stratigraphic sequence examined in this study includes most of the unconformity-bracketed Franklinian tectonostratigraphic sequence of Norris (1985b; 1997a). The base of the studied stratigraphic package coincides with the bases of both the Cambrian System and the Franklinian Sequence. Uppermost strata of this study, the lower Upper Devonian Canol Formation, are near, but not quite at, the top of this tectonostratigraphic sequence. There is, perhaps, some question as to whether any strata in the study region should be embraced within the term "Franklinian", which originally was considered to apply only to strata in the Arctic Islands north of mainland North America; south of the islands, the term "Cordilleran" was applied (Schuchert, 1923). However, recent tectonostratigraphic studies indicate that the Paleozoic Franklinian Miogeocline extends southward onto the northern Canadian mainland to about 65°N, which is the northern limit of its Cordilleran counterpart (Cecile et al., 1997).

The term 'shelf' is used in this study to refer to paleogeographic elements which indicate areas of shallow-water deposition that passed seaward across a definite linear shelf edge zone toward regions of basinal deposition in the sense of Wilson (1975, p. 21). The term 'platform' in a paleogeographic sense is reserved to describe areas of shallow-water deposition that are completely, or partly encircled by areas of basin deposition. However, the phrase 'shelf deposition' is used here, in conjunction with the terms 'slope deposition' and 'basinal deposition', to differentiate broadly between depositional environments (Wilson, 1975) on both shelves and platforms and their adjoining areas of deeper water deposition.

STRATIGRAPHY

Introduction

Previous studies have described lower Paleozoic strata of the study area in varying degrees of detail. As may be seen in the charts of stratigraphic nomenclature in Figures 4 and 5, pre-Devonian strata have received very little attention and a major, largely pre-Devonian, map unit, the ЄDb map unit (Fig. 5), remained without a formal name until the study of Pugh (1983), who extended the sub-Devonian formational nomenclature of the Mackenzie Mountains westward into northern Yukon Territory. There are, however, significant differences between the sub-Devonian lithostratigraphy of the Yukon Stable Block and that of the Mackenzie–Peel Shelf. Consequently, a new name, the Bouvette Formation, has been applied to the ЄDb map unit, in place of the Ronning Group formational nomenclature adopted by Pugh (1983).

In this study, the Richardson Trough is considered to be a natural boundary or division between lower Paleozoic stratigraphic nomenclatures used for the Mackenzie–Peel Shelf region and those of the Yukon Stable Block area. As with sub-Devonian strata, the overlying Devonian strata exhibit considerable differences depending on which side of Richardson Trough you look at. The Devonian nomenclature of Norris (1985) is consistent with this general concept, whereas Pugh (1985) again extended Mackenzie Mountain stratigraphic nomenclature westward across Richardson Trough (Fig. 4). In this important respect, the lower Devonian nomenclature of Norris (1985) is more consistent with nomenclature utilized in the 1:250,000 scale geological maps of Operation Porcupine (Fig. 5).

Several other more specific issues of nomenclature are addressed here as a consequence of more detailed lithostratigraphic and biostratigraphic information. Some formal stratigraphic units have been introduced recently and the applicability of these units is reviewed here. It is suggested that one of these more recent units, the Kutchin Formation (Norris, 1985), should be abandoned before the name comes into general use, because there have been major inconsistencies in the application of this name. A new name, the Mount Dewdney Formation, is proposed for some of the strata formerly included in the Kutchin Formation of Norris (1985). Strata included in the Mount Dewdney have not yet been included as a separate unit on geological maps, but Norris (1985) recognized that these distinctive, yellow, orange and brown weathering beds beneath the Ogilvie Formation at Mount Burgess form a mappable unit and that they rest unconformably on Ordovician strata.

The "Cranswick Formation" of Norris (1968b) is not used here because it has not been mapped at a 1:250,000 scale, is not particularly distinctive in its weathering characteristics, and is not a marker unit signifying an important stratigraphic horizon. Strata identified as belonging to the "Cranswick Formation" (Fig. 4; Norris, 1968b, 1985) are included here as part of the Arnica Formation in agreement with its designation as Arnica Formation in the Snake River map area (Norris, 1982d). There is no doubt that, locally,

dolostones of the typical Arnica Formation pass laterally to fossiliferous limestones in the western part of this map area and that some distinction is warranted. Strata included in the "Cranswick" by Norris (1985) are correlative to both the Arnica and the overlying Landry Formation of the Mackenzie Mountains, but "Cranswick" strata at the "Cranswick" type section (Section 32 in Appendix 5) and in nearby sections (Section 41 in Appendix 5) contain many distinctive, dark, thin bedded, argillaceous and recessive intervals that display pelagic faunas of a much deeper water aspect (e.g., cephalopods and conularids) than those of most of the Arnica Formation, and may uniformly underlie, and be co-extensive with, the basinal shale sequence of the Mount Baird Formation. It seems possible that the "Cranswick Formation" might become a valid unit in the future and may be analogous to the dark limestones of the Grizzly Bear Formation of the west-central Mackenzie Mountains, which also underlies an intrashelf basinal shale sequence in the form of the Funeral Formation (Gabrielse et al., 1973). More detailed surface mapping may provide justification for the formal use of the name "Cranswick Formation" in reference to these distinctive shelf margin deposits. It is, however, probably not justifiable at this time to break out an additional formation if there is no indication of its mappability. Consequently the issue of the relevance of the "Cranswick Formation" is set aside in this study.

Cambrian stratigraphy

Cambrian strata were examined in outcrop at only a few measured sections and scattered localities. No age-specific faunas were collected. Age determinations for the Cambrian units are from Fritz (1992, 1997). The discussion of Cambrian stratigraphy is also largely dependent on Fritz (1997). However, some additional data for Cambrian strata in the central and western parts of the Yukon Stable Block (Fig. 3) are presented and some of the interpretations of Fritz (1992, 1997) have been modified slightly. Cambrian stratigraphy of the Yukon Stable Block differs markedly from that of the Mackenzie–Peel Shelf area east of the Richardson Trough and the Knorr Block (Fig. 3–5). Part of the Lower and Middle Cambrian succession is absent beneath the Franklin Mountain Formation in the Mackenzie Mountains east of the Knorr Block. West of the Knorr Block, a package of westward-thinning silty carbonates and sandstones, the Iltyd, Slats Creek and Taiga formations, were deposited during a time of nondeposition and erosion in the Mackenzie Mountains. Farther northeast, in the subsurface beneath Peel and Anderson plains, silty carbonates, evaporites and sandstones of the Mount Clark, Mount Cap and Saline River formations occupy part of this interval (Fig. 4; see also Pugh, 1983). It is apparent that Early to Middle Cambrian deposition occurred in two distinct basins in the study area, separated by the north-trending Mackenzie–Peel Arch (Fig. 3; Cecile et al., 1997). East of this Arch, the Cambrian Mount Clark to Saline River subsurface sequence accumulated whereas west of the Arch along the western margin of the Knorr Block and the eastern side of Richardson Trough, the Illtyd, Slats Creek and Taiga formations accumulated (Williams, 1987).

Illtyd Formation

Lower and Middle Cambrian strata west of Richardson Trough and the Knorr Block, comprising the Illtyd and Slats Creek formations (Fritz, 1974, 1991, 1997), were examined at only a few outcrop localities. The Illtyd is the lowermost Paleozoic unit west of the Richardson Mountains (Fritz, 1992). There it unconformably overlies several Precambrian units (Rapitan Group, Quartet Group) with a distinct angular unconformity (Fritz, 1997; Norris, 1982c). The silty limestone and massive dolostone of the Lower Cambrian Illtyd Formation were examined briefly in exposures on the west side of Bonnet Plume River immediately west of Margaret Lake in the Wind River map area at about 65°20'N and 134°36'W (Norris, 1982c). Here, a band of Illtyd Formation is mapped overlying Proterozoic conglomeratic diamictite of the Rapitan Group. At this locality, the Illtyd consists of rhythmically bedded, tan to brownish grey lime mudstone and pelletal lime wackestone with orange argillaceous and slightly sandy partings. Orange mottling, distinct burrows, and worm trails occur in some beds. Several oolitic and oncolitic beds also occur in the upper part of this unit. These lithologies are characteristic of the Illtyd (Fritz, 1991).

No fossils were recovered from the Illtyd Formation during the course of this study. Fritz (1991, 1992, 1997) placed the Illtyd within the middle and upper parts of the Lower Cambrian trilobite *Bonnia-Ollenellus* Zone so that the upper contact of the Illtyd with the Slats Creek nearly coincides with the boundary between the Lower Cambrian (Waucoban Series) to Middle Cambrian series (Fig. 5). The upper contact of the Illtyd Formation with the overlying Slats Creek Formation is slightly diachronous, particularly in Richardson Trough (Fritz, 1992).

A series of high-angle faults, probably of normal displacement, intersect the Illtyd exposed west of Margaret Lake. Large parts of the Illtyd have been altered to massively bedded, very coarsely crystalline, light orangish brown weathering and slightly brecciated marble in zones adjacent to the faults. It is not known if these "marbleized" alteration bodies are the same as the thick to massive bedded dolomite in the carbonate buildups described by Fritz (1991) as occurring in the upper part of the Illtyd Formation in nearby sections. In the Illtyd section examined during this study, it is possible that later faults have caused alteration of pre-existing thick-bedded carbonate buildups. No complete sections of Illtyd Formation were examined in this study, but

Fritz (1997) has described its type section in the Wernecke Mountains.

The present-day distribution of the Illtyd is restricted to the region of the Richardson Mountains and immediately south and southwest of these, within three 1:250,000 map areas (Norris, 1981c, 1982b, c). Fritz (1991, 1997) suggested that the Illtyd correlates southeastward with the Sekwi Formation in the Mackenzie Mountains and with the lower part of the Jones Ridge Limestone in east-central Alaska. Northward, the Illtyd extends beneath the Richardson Mountains where it passes laterally into shale of the Road River Group. In the Wernecke Mountains, the Illtyd reaches a maximum thickness of close to 1000 m (Fritz, 1991; 1997) but thins very abruptly and terminates westward beneath the Slats Creek Formation in the Wind River map area (Norris, 1982c).

Slats Creek Formation

The Middle Cambrian Slats Creek Formation overlies the Illtyd and extends beyond its western limit (Fig. 9, 10; Fritz, 1997). The western limit of the Slats Creek is in the western part of the Hart River map area (Norris, 1982b; Fig. 5) where it oversteps the underlying Illtyd and unconformably overlies the Proterozoic Gillespie Lakes and Quartet groups (Fig. 9). Throughout its entire extent, the Slats Creek is overlain by the Upper Cambrian Taiga Formation (Fig. 9; Norris, 1982a, b, c).

The Slats Creek Formation is sparsely fossiliferous, but those present range in age from latest Early Cambrian into the Middle Cambrian trilobite *Glossopleura* Zone (Fritz, 1992; 1997). Throughout much of its extent the base of the Slats Creek coincides approximately with the boundary between the Lower and Middle Cambrian series (Fritz, 1992).

The Slats Creek Formation is laterally discontinuous beneath the Taiga Formation and, in at least one locality, the Slats Creek appears to be bounded on one side by a post-Precambrian fault, the Forest Fault (Fig. 9). The Forest Fault may represent the flank of an uplifted horst block of Quartet Group in pre-Late Cambrian time because of the absence of the Slats Creek on the west side of the fault. There was, however, at least some post-Taiga movement on this fault that offset the Taiga Formation and the ЄDb map unit. It is possible that the fault is largely post-Taiga and that the presence of the Slats Creek only on the east side of the fault is largely fortuitous. It is considered more likely that there was movement on the Forest Fault that predated Taiga deposition (see also Fritz, 1997).

Elsewhere, the appearance and disappearance of the Slats Creek Formation beneath the Taiga Formation is much more gradual and not related in any obvious way to pre- or syndepositional faulting, although there is a local area with an anomalously thick Slats Creek sequence near the centre of the Hart River map area, at Section 35 (MTA-86-3). The Slats Creek has not been mapped west of the Hart River map area. In and near Richardson Trough, the Slats Creek reaches a maximum observed thickness of nearly 1600 m (Fritz, 1997) and generally thins westward to a feather edge beneath the Taiga Formation in the Hart River map area (Norris, 1982b). The Slats Creek, like the Illtyd, is not mapped east of the Knorr Block (Fig. 9).

Middle Cambrian strata are absent in the Snake River map area immediately east of Knorr Block or Knorr Range (Norris, 1982d; Fig. 9). East of Knorr Range, Upper Cambrian to Lower Ordovician dolostones of the Franklin Mountain Formation rest unconformably on Lower Cambrian (Sekwi Formation; Norris, 1982d) or Precambrian strata (e.g., Katherine Group, Fig. 9, see also Norris, 1982d).

The Slats Creek Formation was examined only at two measured sections (Appendix 1). The upper part of an approximately 500 m-thick sequence of reddish brown to orange weathering, medium to thick bedded, weakly metamorphosed sandstone (or quartzite) with some burrowed beds was examined at Section 35 (Appendix 5) near the centre of the Hart River map area. Similar Slats Creek sandstones were examined at Section 11 (MTA-86-15) in the southeastern part of the Hart River map area where the Slats Creek is only 12 m thick. Scattered solitary beds of sandy, chert–pebble conglomerates occur in this thin Slats Creek sequence. Similar lithologies, in addition to maroon and orange siltstones and a few scattered limestone mounds, occur in the type section of the relatively thick Slats Creek Formation in the south-central part of the Wind River map area, near or on the west flank of Richardson Trough (Fritz, 1997).

Taiga Formation and equivalents

The Taiga Formation (Fritz, 1997) overlies, and is coextensive with the Slats Creek Formation west of the Knorr Range to near the western edge of the Hart River map area (Norris, 1982b, c, d). It unconformably overlies Precambrian strata in the westernmost part of the Hart River map area, where it extends a short distance beyond the western limit of the underlying Slats Creek Formation, and also on the west, or upthrown side, of the Forest Fault in the Wind River map area where, locally, the Slats Creek is absent. Where it is present, the Taiga is overlain by carbonates of the Bouvette Formation (formerly the ЄDb map unit of Norris, 1982a, b, c). The Bouvette Formation extends beyond the western limit of the Taiga Formation (Fig. 5).

The maximum thickness of the Taiga Formation is about 600 m at its type section in the Wernecke Mountains (Fritz, 1997). Like the Slats Creek, the Taiga does not extend east of the Knorr Range. Westward, the thickness of the Taiga is non-uniform. It is not present as a map unit in the Ogilvie River map area west of the Hart River map area (Norris, 1982a, b). Like the underlying Illtyd and Slats Creek formations, the Taiga Formation generally thins westward to less than 100 m in the western part of the Wind River map area and in the Hart River map area.

The Taiga Formation was measured at two sections (35 and 11; Fig. 9) in the Hart River map area (Appendices 1, 5). At these localities, the Taiga is composed of silty to sandy, yellow and orange weathering, thin to medium bedded dololaminites and dolomudstones containing mudcracks, small-scale laterally linked hemispheroidal stromatolites, and digitate stromatolites that are polygonal in plan (Fig. 9). Scattered beds and lenses of sand and mudchip breccia occur throughout the lower parts of the Taiga in both of these sections. Multiple, reddish orange-to-red-stained erosion surfaces also occur in the lower part of the Taiga in Section 35 (Appendix 5). The upper part of the Taiga in these sections is dominantly thin bedded, featureless dololaminite. Overall, the Taiga is colour-banded in appearance, in contrast to the uniform grey of the overlying Bouvette Formation and the brownish orange coloration of the underlying Slats Creek Formation (see also Fritz, 1997).

Faunas from the Taiga Formation in its type area indicate that it includes both Middle and Upper Cambrian strata (Fritz, 1997). Basal beds of the Taiga probably fall in the uppermost part of the *Glossopleura* Zone, whereas the upper, more fossiliferous part of the formation falls within the *Cedaria–Crepicephalus* Zone of the lower Upper Cambrian (Fritz, 1992; 1997). No faunas from the Taiga were collected during this study.

Mount Clark, Mount Cap and Saline River formations

The Mount Clark, Mount Cap and Saline River formations are restricted to the extreme easternmost part of the study area and have been penetrated in only two wells: Atlantic et al. Ontaratue H-34 and Shell Arctic Red West G-55 (Fig. 10, 11). These wells fall near the westernmost limit of the formations, in the Anderson and Peel plains (Pugh, 1983; Dixon, 1997). The formations are not present across the Mackenzie–Peel Arch (Fig. 3, 10, 11; Pugh, 1983) which, throughout Cambrian time was a syndepositional high with varying degrees of topographic relief (see Mackenzie Arch *in* Aitken, 1993). The rise of the Mackenzie–Peel Arch along the western margin of the Mackenzie–Peel Shelf eventually formed a closed basin at the end of Middle Cambrian time in which the evaporites and red shales of the Saline River Formation accumulated (Aitken et al., 1973). The map shown in Figure 2 of Dixon (1997) indicates that the western limit of these strata lies east of the H-34 and G-55 wells in contradiction of Pugh (1983, fig. 24). However, the presence of anhydrite bands in varicoloured shales in the cored interval from 9480 to 9499 ft. (2889.5-2895.3 m) in the H-34 well may indicate that the Saline River Formation is, in fact, present beneath the Franklin Mountain Formation in these wells. The strata identified by Pugh (1983) as belonging to the Mount Cap and Mount Clark formations beneath the Saline River Formation in the Ontaratue H-34 well may, however, be more properly assigned to the Proterozoic (Dixon, pers. comm.). Similar strata in the Arctic Red West G-55 well identified by Pugh (1983) as sub-Franklinian Mountain Cambrian, may, in fact, also be Proterozoic rather than Cambrian.

These formations were not examined in the course of this study and the reader is referred to Pugh (1983, 1993), Aitken et al. (1973), Fritz (1992, 1997), and Williams (1987) for more detailed descriptions and interpretations of these units. In essence, the Mount Clark Formation is a basal, white to purplish or reddish grey transgressive sandstone that is up to several hundred metres thick and is developed along the sub-Cambrian unconformity. It is generally unfossiliferous, but the presence of *Skolithos* indicates an Early Cambrian age (Fritz, 1997). The Mount Cap Formation consists of interbedded green and brown, thin bedded, fine grained sandstone and grey, rusty weathering shale, and is co-extensive with and conformably overlies the Mount Clark Formation. Fossils from the Mount Cap Formation range from the late Early Cambrian *Bonnia–Ollenellus* Zone to the Middle Cambrian *Glossopleura* Zone (Fritz, 1992, 1997).

The Saline River Formation disconformably to unconformably overlies the Mount Cap Formation (Fig. 10, 11). Westward toward the Mackenzie–Peel Arch, it unconformably overlies the Mount Cap Formation and,

Figure 9. *Figure 9A shows lower Paleozoic stratigraphy along an east–west line of section extending westward from Section 27 (MTA-82-11) to Section 14 (MTA-82-16) (see Fig. 6). The Knorr Block at the southern end of Richardson Trough occupies the region where lower Palaeozoic strata of the Mackenzie–Peel Shelf pass westward to those of the Yukon Stable Block, with major changes in lithostratigraphy and stratigraphic nomenclature. Figure 9B is the westward continuation of Figure 9A, from Section 17 (MTA-85-2) westward to Section 28 (MTA-86-28). A basement horst block, similar to the Knorr Block farther east, is inferred to exist beneath the relatively thin lower Paleozoic sequence at Section 25 (MTA-86-12).*

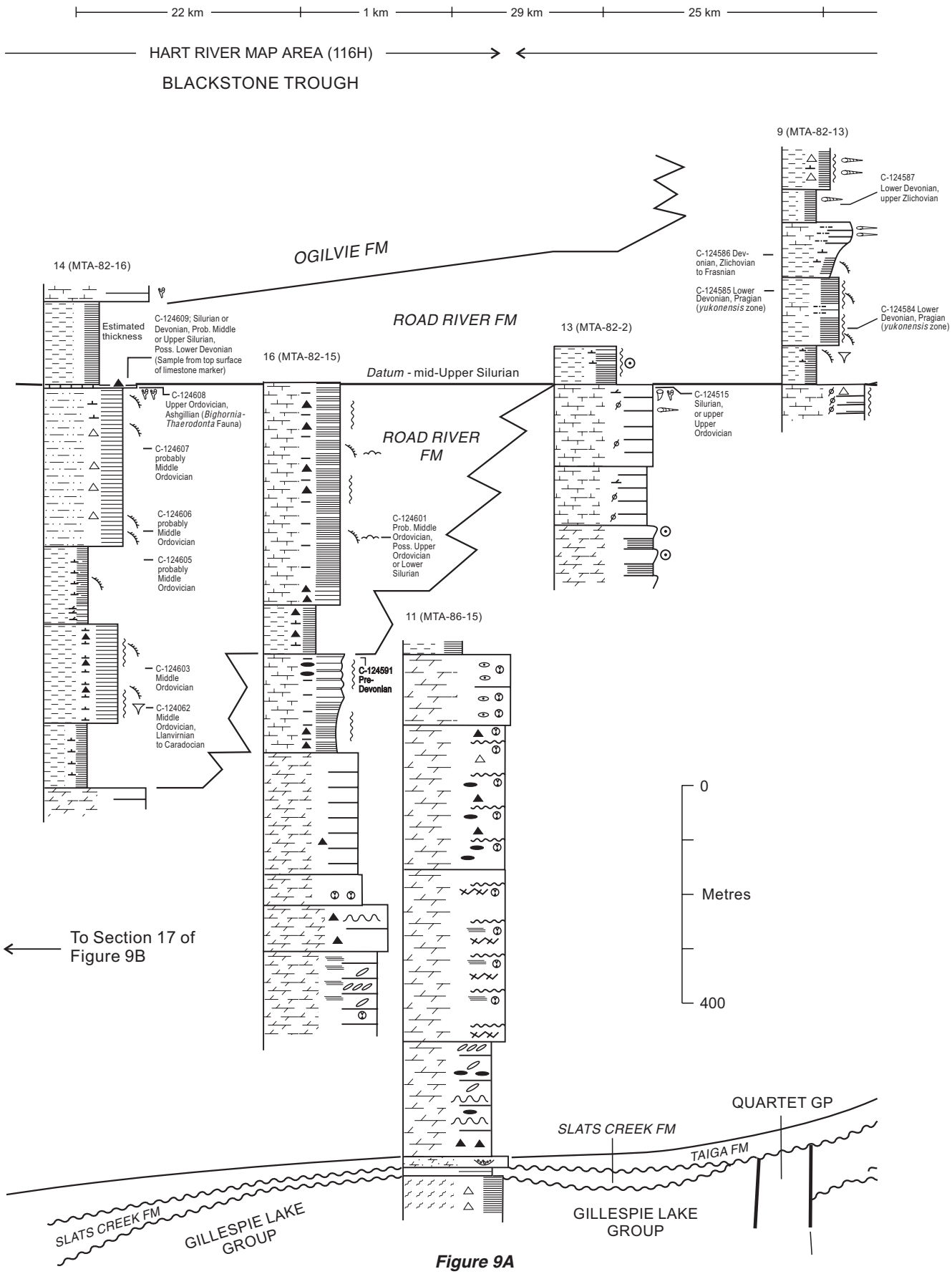

22 km
1 km
29 km
25 km
HART RIVER MAP AREA (116H)
BLACKSTONE TROUGH
9 (MTA-82-13)
C-124587
Lower Devonian,
upper Zlichovian
OGILVIE FM
14 (MTA-82-16)
C-124586 Dev-
onian, Zlichovian
to Frasnian
C-124585 Lower
Devonian, Pragian
(yukonensis zone)
C-124584 Lower
Devonian, Pragian
(yukonensis zone)
ROAD RIVER FM
Estimated
thickness
C-124609; Silurian or
Devonian, Prob. Middle
or Upper Silurian,
Poss. Lower Devonian
(Sample from top surface
of limestone marker)
13 (MTA-82-2)
16 (MTA-82-15)
Datum - mid-Upper Silurian
C-124608
Upper Ordovician,
Ashgillian (Bighornia-
Thaerodonta Fauna)
C-124515
Silurian,
or upper
Upper
Ordovician
ROAD RIVER
FM
C-124607
probably
Middle
Ordovician
C-124606
probably
Middle
Ordovician
C-124601
Prob. Middle
Ordovician,
Poss. Upper
Ordovician
or Lower
Silurian
C-124605
probably
Middle
Ordovician
11 (MTA-86-15)
C-124591
Pre-
Devonian
C-124603
Middle
Ordovician
C-124062
Middle
Ordovician,
Llanvirnian
to Caradocian
0
Metres
400
To Section 17 of
Figure 9B
QUARTET GP
SLATS CREEK FM
TAIGA FM
SLATS CREEK FM
GILLESPIE LAKE
GROUP
GILLESPIE LAKE
GROUP

Figure 9A

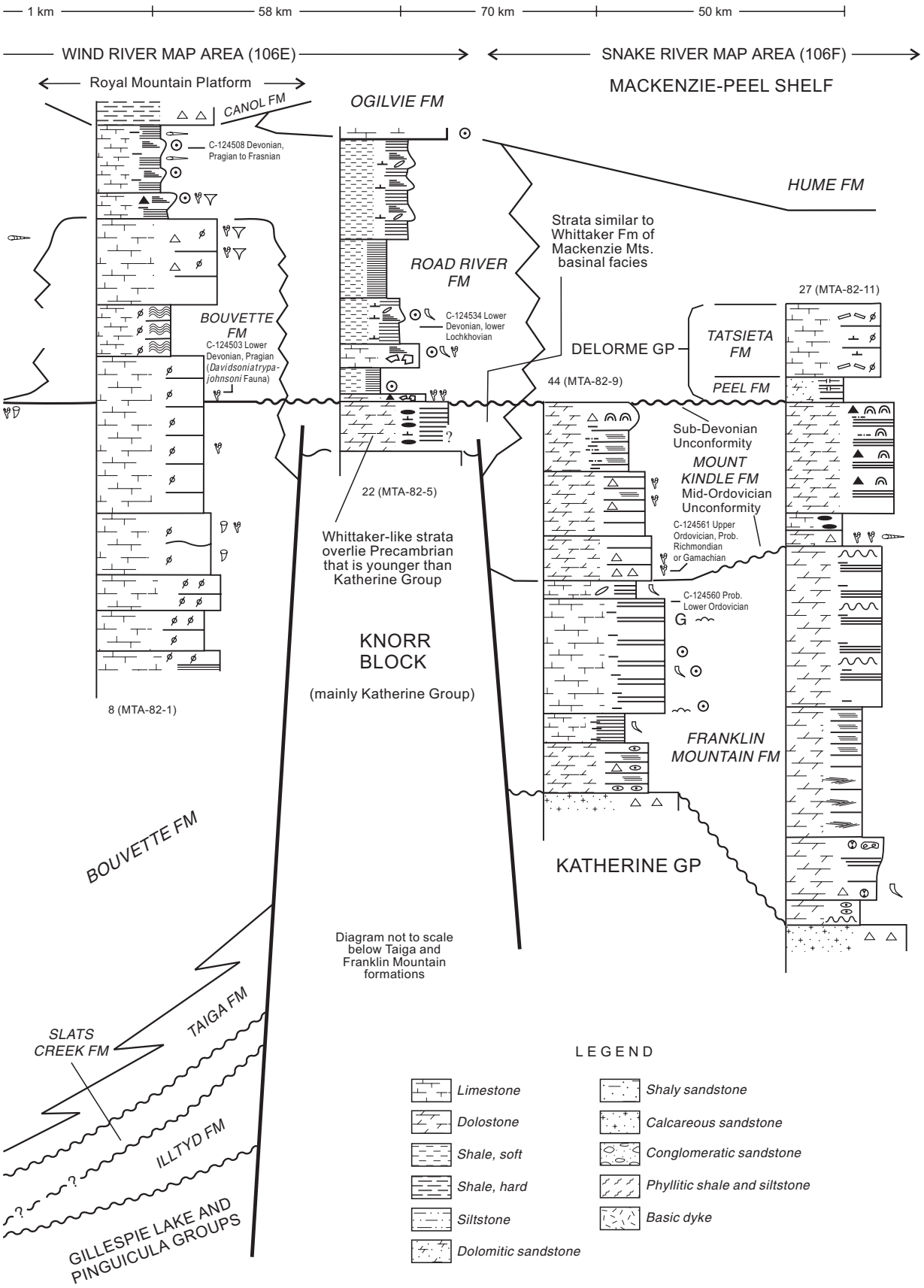


Figure 9A (cont.)

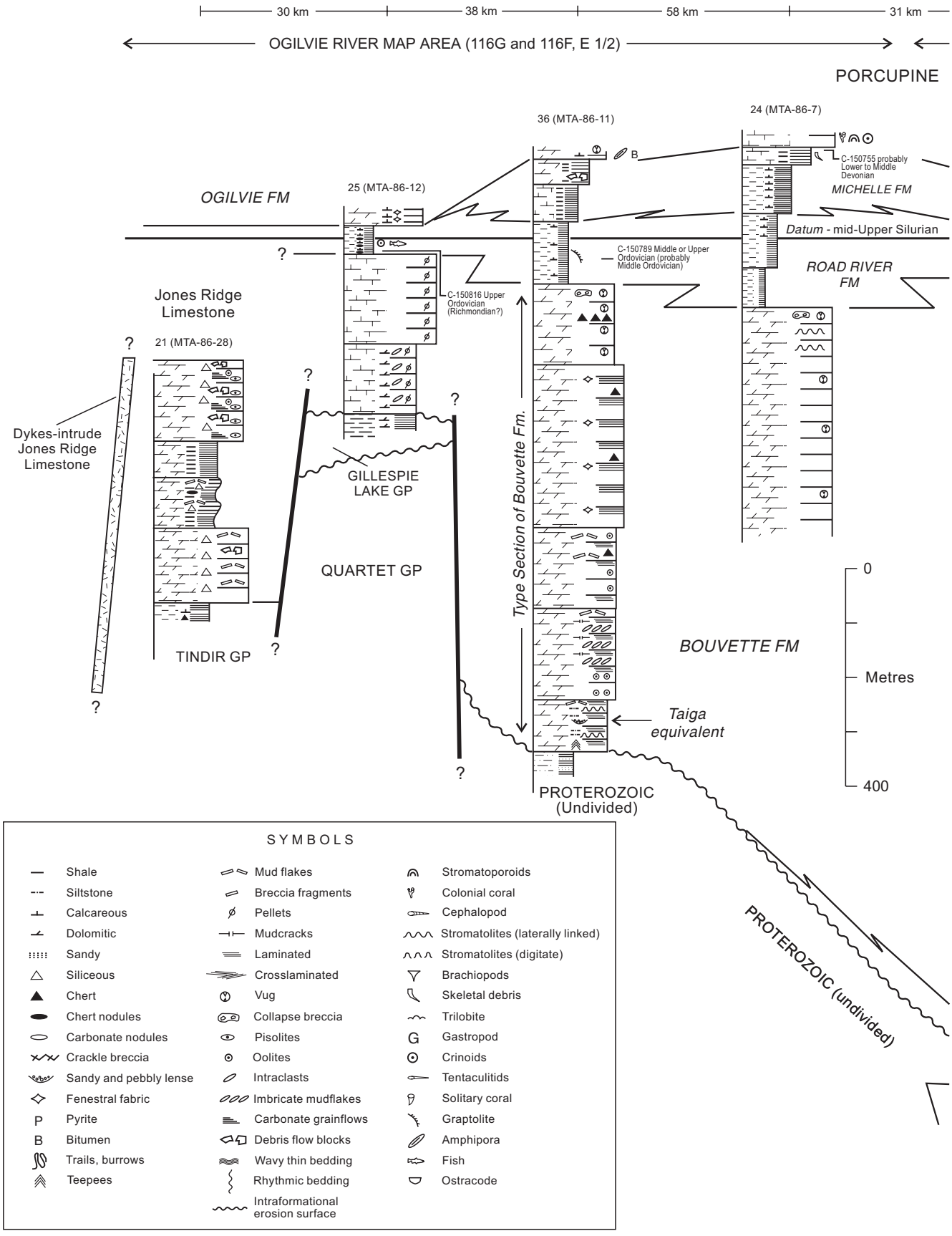

30 km
38 km
58 km
31 km
OGILVIE RIVER MAP AREA (116G and 116F, E 1/2)
PORCUPINE
36 (MTA-86-11)
24 (MTA-86-7)
25 (MTA-86-12)
21 (MTA-86-28)
OGILVIE FM
MICHELLE FM
ROAD RIVER FM
Datum - mid-Upper Silurian
C-150755 probably Lower to Middle Devonian
C-150789 Middle or Upper Ordovician (probably Middle Ordovician)
C-150816 Upper Ordovician (Richmondian?)
Jones Ridge Limestone
Dykes-intrude Jones Ridge Limestone
GILLESPIE LAKE GP
QUARTET GP
TINDIR GP
Type Section of Bouvette Fm.
BOUVETTE FM
Taiga equivalent
PROTEROZOIC (Undivided)
PROTEROZOIC (undivided)
0
Metres
400
SYMBOLS
Shale
Siltstone
Calcareous
Dolomitic
Sandy
Siliceous
Chert
Chert nodules
Carbonate nodules
Crackle breccia
Sandy and pebbly lense
Fenestral fabric
Pyrite
Bitumen
Trails, burrows
Teepees
Mud flakes
Breccia fragments
Pellets
Mudcracks
Laminated
Crosslaminated
Vug
Collapse breccia
Pisolites
Oolites
Intraclasts
Imbricate mudflakes
Carbonate grainflows
Debris flow blocks
Wavy thin bedding
Rhythmic bedding
Intraformational erosion surface
Stromatoporoids
Colonial coral
Cephalopod
Stromatolites (laterally linked)
Stromatolites (digitate)
Brachiopods
Skeletal debris
Trilobite
Gastropod
Crinoids
Tentaculitids
Solitary coral
Graptolite
Amphipora
Fish
Ostracode

Figure 9B

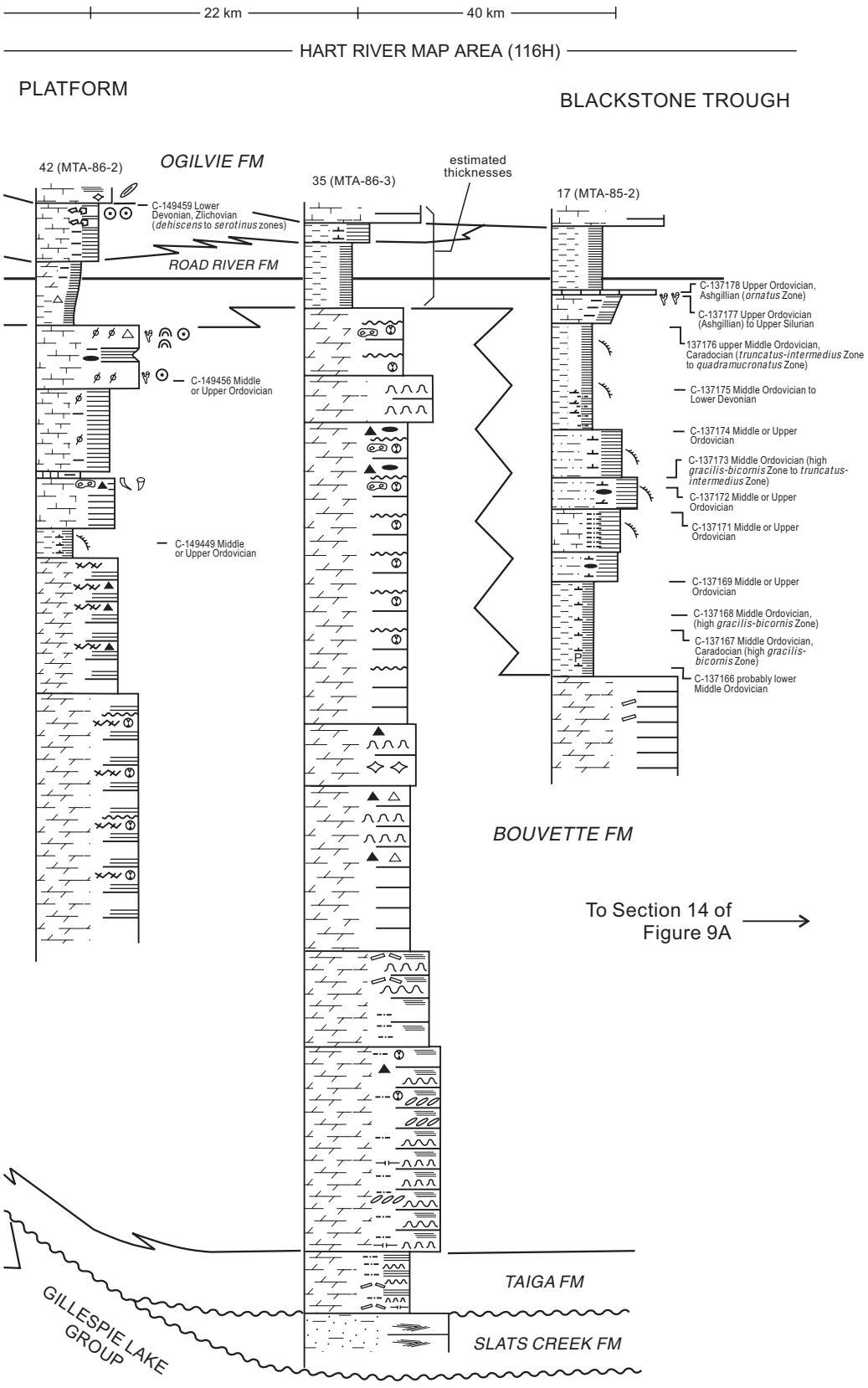


Figure 9B (cont.)

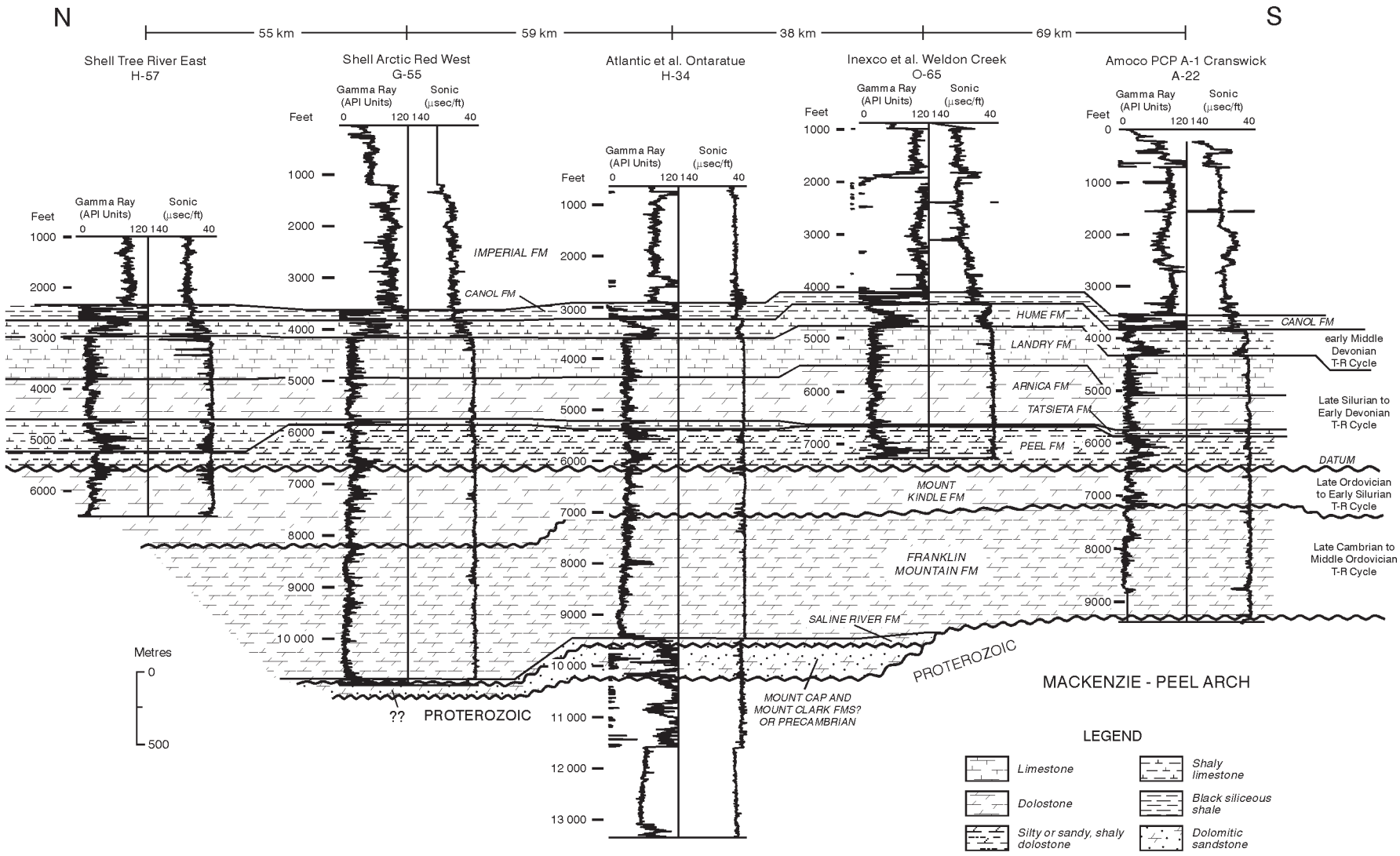


Figure 10. *A north–south stratigraphic cross-section of lower Paleozoic strata across the Mackenzie–Peel Shelf (see Fig. 6). These strata are remarkably uniform in thickness and were deposited during three, distinct, transgressive–regressive cycles (T–R) that correspond, in ascending order, to the Late Cambrian to Middle Ordovician Sauk Sequence, the Late Ordovician to Early Silurian Tippecanoe Sequence, and the lower part of the Early Devonian to Late Mississipian Kaskaskia Sequence (Sloss, 1963).*

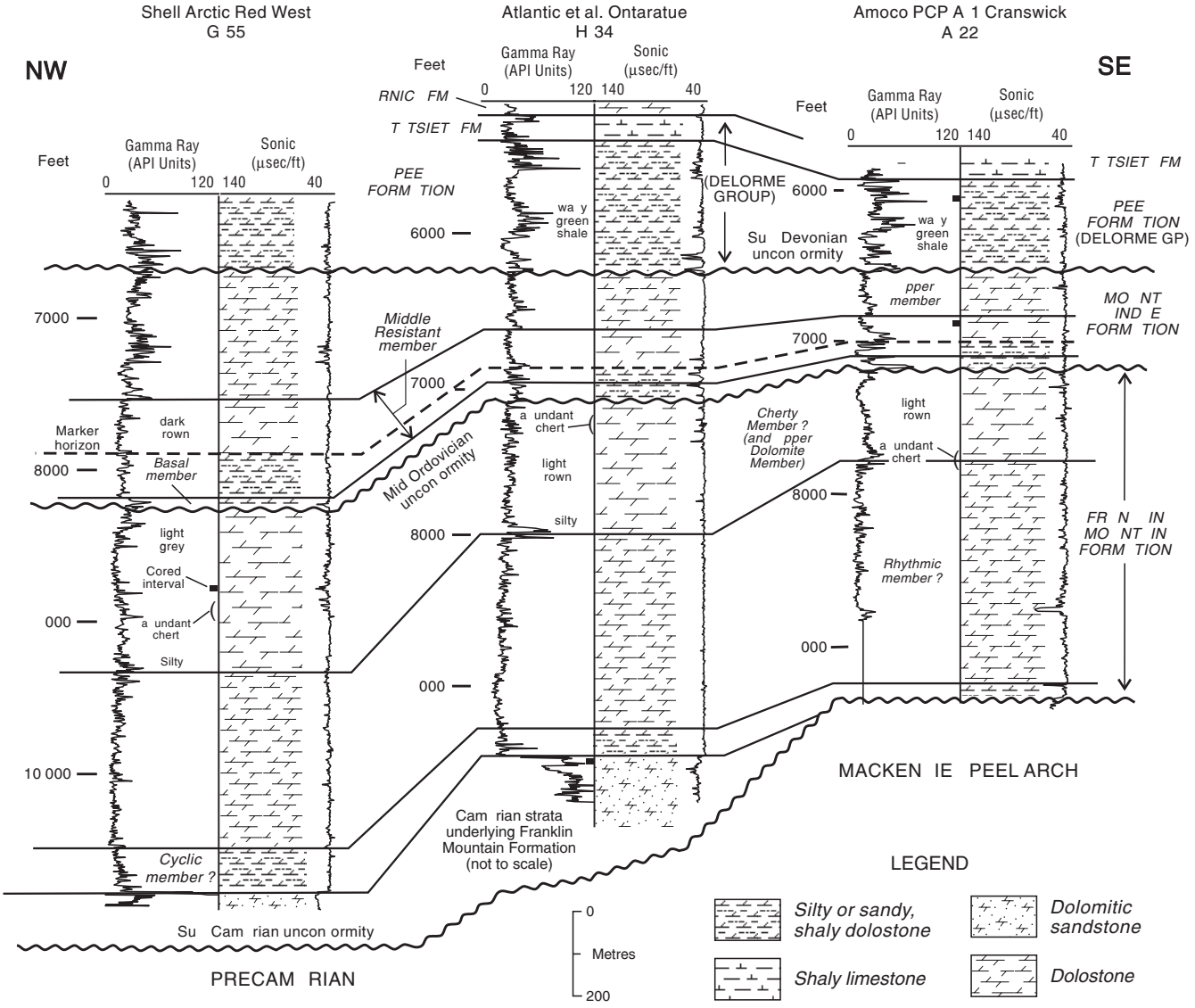


Figure 11. *southeast to northwest stratigraphic cross-section of lower Paleo oic strata across the Macken ie Peel Shelf (see Fig. 6), illustrating the lateral continuity of the stratigraphic units and subdivisions of the Franklin Mountain and Mount indle formations. lso shown is the shaly log response of the Peel and Tatsieta formations and the well developed and unconformable lower contact of the Peel Formation with the Mount indle Formation.*

farther west and nearer the arch, unconformably overlies Proterozoic units (Pugh, 1983; Aitken et al., 1973; Fig. 5). The Saline River attains a maximum thickness of about 300 m in the subsurface near Norman Wells, where relatively thin lower and upper shaly and sandy clastic members enclose a thick salt member. No age-diagnostic fossils have been recovered from the Saline River, but from its stratigraphic position it has been assigned a Late Cambrian age (Fritz, 1997). By latest Cambrian time the entire Mackenzie–Peel Shelf was blanketed by shallow-water carbonates of the Franklin Mountain Formation.

Cambrian unconformities and regional tectonics

Fritz (1997) suggested that sub-Bouvette erosion removed the Taiga Formation locally in the Illtyd Range immediately northeast of the Wernecke Mountains. He regards strata mapped as the Taiga Formation beneath the "ЄDb" map unit at this locality (Norris, 1982c) to be improperly identified and that the absence of the Taiga in the Illtyd Range is evidence for sub-ЄDb (i.e., sub-Bouvette) erosional removal of the Taiga. If this is true then the more regional absence of the Taiga beneath the ЄDb map unit throughout the entire Ogilvie River map area (Norris, 1982a) should also be attributable to sub-ЄDb erosion.

This study, however, indicates that the Taiga Formation, at least as mapped in the Hart River map area, is a facies equivalent of the lowermost strata of the Bouvette Formation in the Ogilvie map area (Fig 9B). Strata of the lowermost part of the Bouvette Formation in the Ogilvie River map area are similar in many aspects to Taiga strata (Fig. 9B). For example, the basal units of the Bouvette Formation in sections 18 and 36 (MTA-86-10 and MTA-86-11) in the Ogilvie River map area are yellowish grey, silty and sandy dololaminites containing mudflake breccias, teepee structures, and digitate stromatolites (Appendix 5). The only difference between these basal Bouvette strata and the Taiga Formation in the Hart River map area is the greater degree of orange coloration of Taiga strata. This apparent lithological correlation between basal Bouvette strata in the Ogilvie River map area and the Taiga Formation farther east may indicate that the Taiga and the Bouvette should be regarded as a continuous depositional unit. This implies that the unconformity beneath the Bouvette Formation in the Ogilvie River map area is continuous with the unconformity beneath the Taiga Formation in the Hart River map area and that the Taiga is merely a basal facies equivalent of the Bouvette (Fig. 12). The admixture of bright-orange weathering silts and sands in the Taiga may simply be the result of transgressive reworking of underlying orange siliciclastics of the Slats Creek Formation and of the Proterozoic Gillespie Lake, Pinguicula and Quartet groups.

This interpretation is consistent with the map distribution of the Taiga and Slats Creek formations beneath the Bouvette Formation. If the observed western limits of the Taiga and Slats Creek were simply the result of sub-Bouvette erosion of uplifted Taiga and Slats Creek strata, then we should expect to see the western limit of the underlying Slats Creek to be west of the Taiga western limit. The fact that the opposite is true indicates that sub-Taiga erosion, rather than sub-Bouvette erosion, is responsible for the western truncation of the Slats Creek, or alternatively, that the western limit of the Slats Creek was its westernmost depositional limit (Fig. 12). Consequently, the westward-thinning wedge of probable Cambrian strata beneath strata of the Bouvette and its equivalents that can be seen on east–west seismic sections across southern Eagle Plain east of the Aquitaine Alder C-33 well (Fig. 13) has been interpreted as being the result of erosional truncation of the combined Slats Creek and Illtyd formations beneath the combined Bouvette and Taiga formations. This sub-Cambrian unconformity is at a depth equivalent to a two-way travel time of about 2.8 seconds at the location of Alder C-33, and is a strong, continuous reflector.

Whether the Illtyd Formation has been erosionally removed or whether it has been truncated beneath the Slats Creek Formation as suggested by Fritz (1997), can't be determined. Some degree of truncation is implied by the rapid westward disappearance of this unit beneath the Slats Creek and the fact, as mentioned by Fritz (1997), that the lower part of the Jones Ridge Limestone in eastern Alaska correlates with the Illtyd. The Slats Creek, on the other hand, was deposited during a time of widespread nondeposition and erosion of Precambrian sandstones of the Katherine Group across and east of the Knorr Range, or the Knorr Block, and Precambrian siliciclastics across the area of the Ogilvie Arch (Fig. 5, 9, 12). This is consistent with the possibility that the present distribution of the Slats Creek is similar to its original depositional limits (Fig. 12).

In summary, Cambrian tectonics and sedimentation were dominated by subsidence of the west side of the Knorr Fault (or fault zone) concomitant with uplift of the Ogilvie Arch, particularly in Middle Cambrian time. By Late Cambrian time Road River Group basinal argillaceous limestone and shale deposition had begun in the Richardson Trough (Fig. 12) and carbonate deposition, represented by the lower parts of the Bouvette and Franklin Mountain formations, had spread across the entire Yukon Stable Block and Mackenzie–Peel Shelf. Continued down-to-west subsidence of Knorr Fault, inferred to have occurred at this time, and possibly also by the Trevor Fault, may have contributed to the origin of Richardson Trough (Fig. 12). Down-to-west movement of the west side of Trevor Fault may have caused the encroachment of Road River strata onto Precambrian strata on the northern part of the Knorr Block in Late Cambrian time. Possibly, this was accompanied by a downward tilt northward of the northern continuation of the Knorr Block beneath Richardson Trough so that only a thin Road River sequence accumulated across the Knorr Block whereas a thick Road River sequence accumulated in the trough.

East of Richardson Trough and the Knorr Block, sedimentation was confined to the eastern part of the Mackenzie–Peel Shelf during the time that the Mackenzie–Peel Arch had topographic expression and was undergoing erosion. East of the Knorr Fault across the Knorr Range and the northernmost part of the Mackenzie Mountains, there was no Cambrian deposition across the arch until Late Cambrian time when peritidal dolostones of the Franklin Mountain Formation were deposited (e.g., at sections 27 and 44, MTA-82-11 and MTA-82-9; Appendix 5). By the end of the Cambrian, the Arch, though still active, no longer broached sea level, and shallow-water carbonates of the lower part of the Franklin Mountain Formation were deposited across the entire Mackenzie–Peel Shelf.

The sub-Saline River unconformity represents a relatively minor hiatus or short period of erosion within the Cambrian part of the Sauk Sequence (Aitken, 1993). The deeper, sub-Mount Clark–Mount Cap (or Old Fort Island) unconformity is the more significant unconformity and represents, along with the sub-Franklin Mountain unconformity, the lower bounding unconformity of the

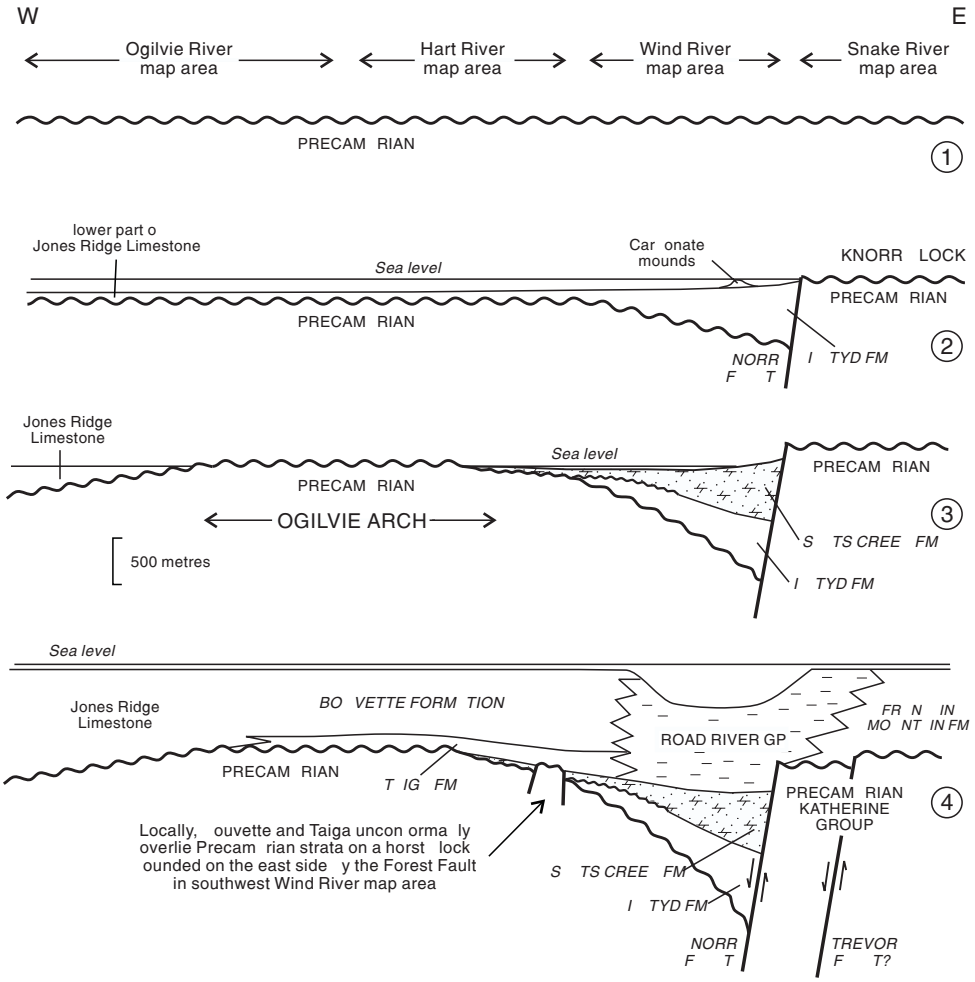


Figure 12. *schematic reconstruction of the tectonic and depositional history along a line of section extending westward from the Snake River map area (106F) to the west side of Ogilvie River map area (116G and 116F, E1/2). Episode 1 shows the post-Protero oic erosion surface. Episode 2 shows Early Cambrian Illtyd deposition against the norr Fault. plift of the norr Block and uplift and eastward tilting of the Ogilvie rch region led to erosion of siliciclastics and deposition of the Slats Creek Formation in Middle Cambrian time (episode 3). Finally, widespread subsidence led to inundation of the entire region and deposition of the Taiga and Bouvette formations, and down-to-west movements on the ancestral norr and Trevor faults contributed to the formation and deepening of Richardson Trough, which expanded southward onto the norr Block after Slats Creek and Illtyd deposition (episode 4). Episode 3 was accompanied by the development of a local horst block bounded on its east side by the Forest Fault. The distinctive, silty and sandy, bright orange shoreface deposits of the Taiga are probably the result of transgressive reworking of underlying brightly coloured Slats Creek and Precambrian siliciclastics during the inundation of Ogilvie rch.*

continent-wide Sauk Sequence (Sloss, 1963) in the District of Mackenzie (Aitken, 1993). This unconformity, informally referred to as the "sub-Cambrian unconformity", is underlain by Precambrian rocks across the region of the Mackenzie–Peel Shelf. In the region of Mackenzie Arch, Franklin Mountain strata overlie Precambrian strata with a distinctly angular unconformity. It seems likely that the sub-Cambrian unconformity that developed across Ogilvie Arch represents, at least in part, the same exposure event as the sub-Cambrian unconformity across Mackenzie–Peel Shelf.

Ordovician to Middle Silurian stratigraphy

Early to mid-Ordovician time was a period of uniform carbonate deposition across the entire Yukon Stable Block

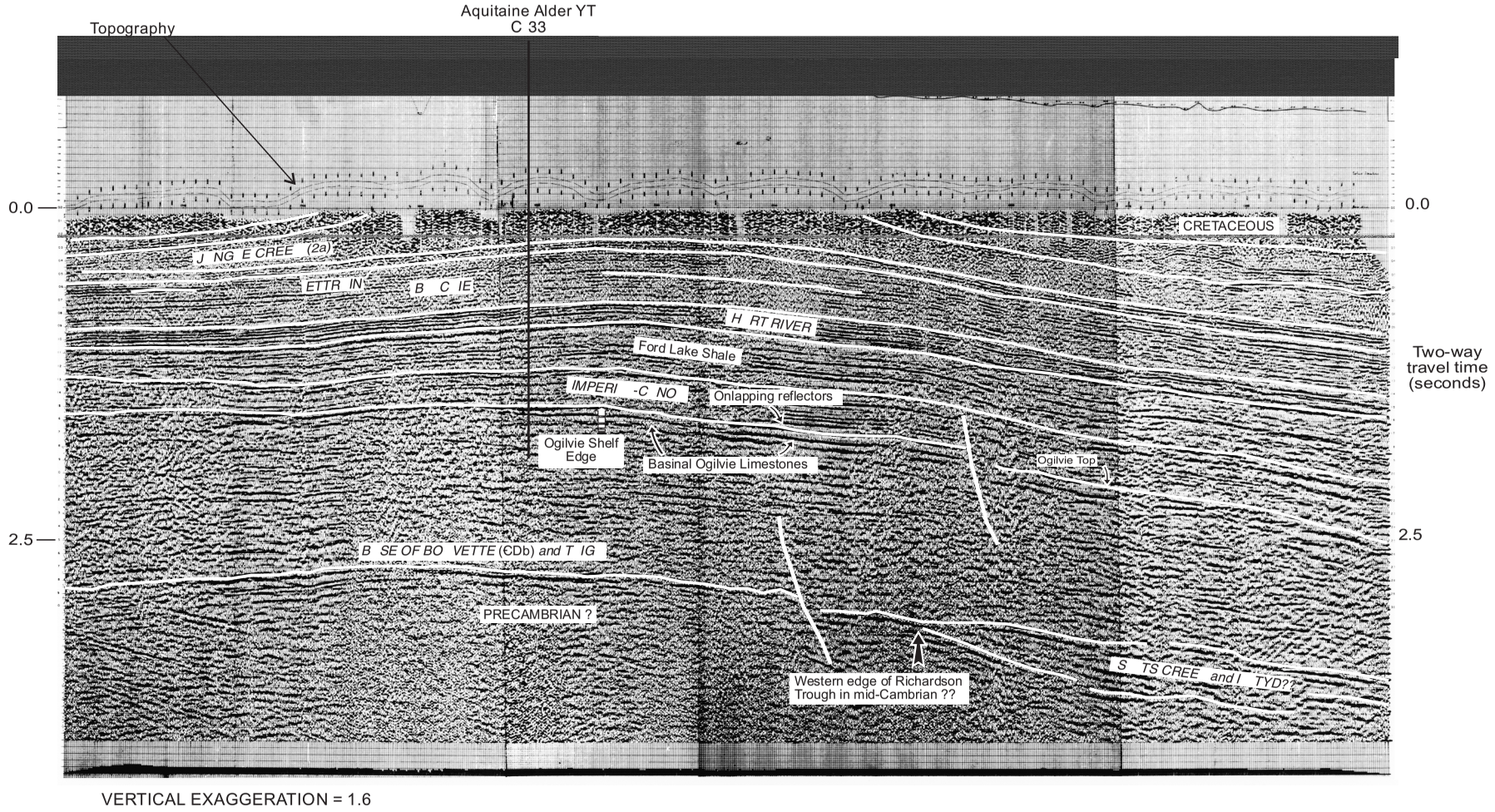


Figure 13. *n unmigrated seismic line (EP-5) from quitaine of Canada td. Trending east west through the quitaine lder YT C-33 well near the southern margin of Eagle Plain (Fig. 6). This seismic section is parallel to the outcrop line of section for both Figures 50 and 54 and also shows the eastward shelf to basin transition of the Ogilvie Formation.*

and the Mackenzie–Peel Shelf that followed the inundation of formerly extensive areas of exposed Precambrian and Lower to mid-Cambrian strata. Dolostones of the Bouvette Formation accumulated across the Yukon Stable Block, both in outcrop across the southern part of the Yukon Stable Block (Fig. 9) and in the subsurface of the Eagle Plain (Fig. 14). The Bouvette passes eastward to calcareous shales of the Road River Group in the Richardson Trough (Fig. 14, 15). East of Richardson Trough and the Knorr Block, dolostones of the Upper Cambrian and Lower Ordovician Franklin Mountain Formation rest unconformably on Cambrian (Fig. 14) and on Precambrian strata (Fig. 9).

After this Late Cambrian to mid-Ordovician marine transgression, the depositional histories of the Mackenzie–Peel Shelf and the Yukon Stable Block diverged. East of Richardson Mountains and the Knorr Block, Middle Ordovician time is represented primarily by an unconformity that separates the Franklin Mountain from the overlying Upper Ordovician to mid-Silurian Mount Kindle Formation (Fig. 9). Aitken et al. (1982) described this unconformity in the Upper Ramparts River (106G) and San Sault Rapids (106H) map areas immediately to the east of the study region (Fig. 2). Earlier, Norford and Macqueen (1975) and Meijer-Drees (1975) described the regional development of this unconformity throughout the central and southern parts of the Mackenzie Mountains and in the subsurface of the Great Slave Plain. More recently, Pugh (1983, 1993) extended this unconformity throughout the subsurface of the Northern Interior Plains north of Norman Wells. However, west of Richardson Trough, in the Yukon Stable Block, the unconformity is not present. Instead, Middle Ordovician strata are a mix of limestones and dolostones of the Bouvette Formation and shales of the Road River Formation. By Late Ordovician time, shales of the Road River Formation had been deposited across most of the Yukon Stable Block (Fig. 9, 14). The regional distribution of these Middle and Upper Ordovician Road River shales across the Yukon Stable Block has been described previously by Lenz (1972) and, more recently, by Cecile and Norford (1992).

The Knorr Block had a strong influence on Ordovician to Early Silurian deposition. Clearly, Knorr Block must have been elevated either during Bouvette–Franklin Mountain deposition or during latest Silurian time in order to have led to the preservation across this feature of only a very thin sequence of strata that can be assigned a Cambrian to Ordovician age above Precambrian strata (Section 22, MTA-82-5 in Fig. 9).

By mid-Silurian time, Road River shale had been deposited across the entire Yukon Stable Block except in uplifted areas, such as the Dave Lord High (Fig. 3), where Devonian strata of the Ogilvie Formation rest unconformably on Ordovician-aged carbonates of the Bouvette Formation (Norris, 1985). In contrast, the entire area of the Mackenzie–Peel Shelf, as well as of the Knorr Block, was subaerially exposed at this time (Fig. 9). The Mackenzie–Peel Shelf and the Yukon Stable Block continued to have distinctly different depositional histories into later Silurian and Devonian time.

Franklin Mountain and Mount Kindle formations (Ronning Group)

The Franklin Mountain Formation forms the lower part of the Ronning Group. Although the Ronning Group has been declared to be an obsolete stratigraphic name (see Hills et al., 1981, p. 154), Pugh (1983) revived the use of the term "Ronning Group" to refer to the combined Franklin Mountain and overlying Mount Kindle formations. He also included a third unit, the Peel Formation, in this group because he interpreted the Peel Formation as a largely uninterrupted continuation of Mount Kindle deposition and the upper contact of the Peel Formation a major unconformity, the "Sub-Devonian unconformity" (Pugh, 1983, p. 22). See Pugh (1983) for a complete review of the history of the term Ronning Group in stratigraphic and mapping studies.

The Ronning Group is considered here also to be a useful stratigraphic term. However, the Ronning Group as used in this study includes strata of the Franklin Mountain and Mount Kindle formations only, in accordance with the usage of Macqueen (1970). Strata of the Peel Formation are not included in the Ronning Group. This departure from the usage of Pugh (1983) is adopted because it has been determined in this study that the major sub-Devonian unconformity occurs at the base, rather than at the top, of the Peel Formation. The Peel Formation itself is more properly regarded as being part of the Delorme Group, which unconformably overlies strata of the Mount Kindle Formation throughout the Mackenzie Mountains (e.g., Aitken et al., 1982; Morrow, 1991).

Pugh (1983) also extended the Ronning Group, with its component formations, the Franklin Mountain and the Mount Kindle formations, westward across the Richardson Trough and onto the Yukon Stable Block. This westward extension of the Mount Kindle and Franklin Mountain formations, and hence the Ronning Group, has not been adopted in this study. Instead, the ЄDb map unit of Norris (1985a) has been accorded formation status as the Bouvette Formation, rather than being included within the Mount Kindle and Franklin Mountain formations.

The Franklin Mountain and Mount Kindle formations (i.e. the Ronning Group) extend throughout the entire subsurface of the Peel and Anderson plains, or, in other words, throughout the northern part of the Mackenzie–Peel Shelf (Fig. 15, 16). Both formations extend without interruption throughout this area and their combined thickness is remarkably constant at about 600 to 1200 m

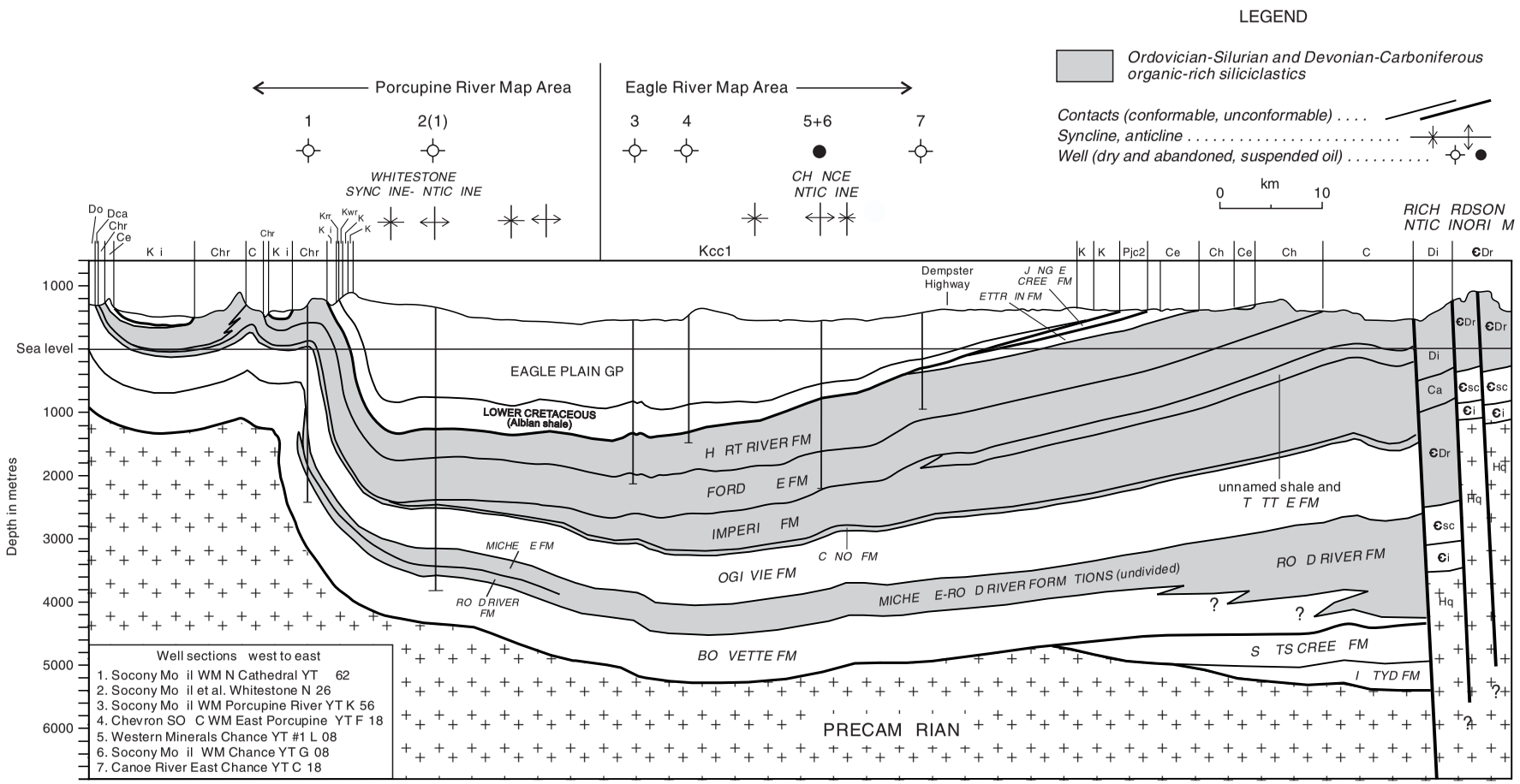


Figure 14. *n east west structural cross-section across Eagle Plain along 66°07'30" latitude westward from Eagle River map area (116I) into Porcupine River map area (116I and 116 , E1/2). Thick lines on subsurface stratigraphic contacts represent unconformities. Siliciclastics are shaded. See Norris (1981a, b) for explanation of map symbols (e.g., the 'Do' map unit represents the Ogilvie Formation).*

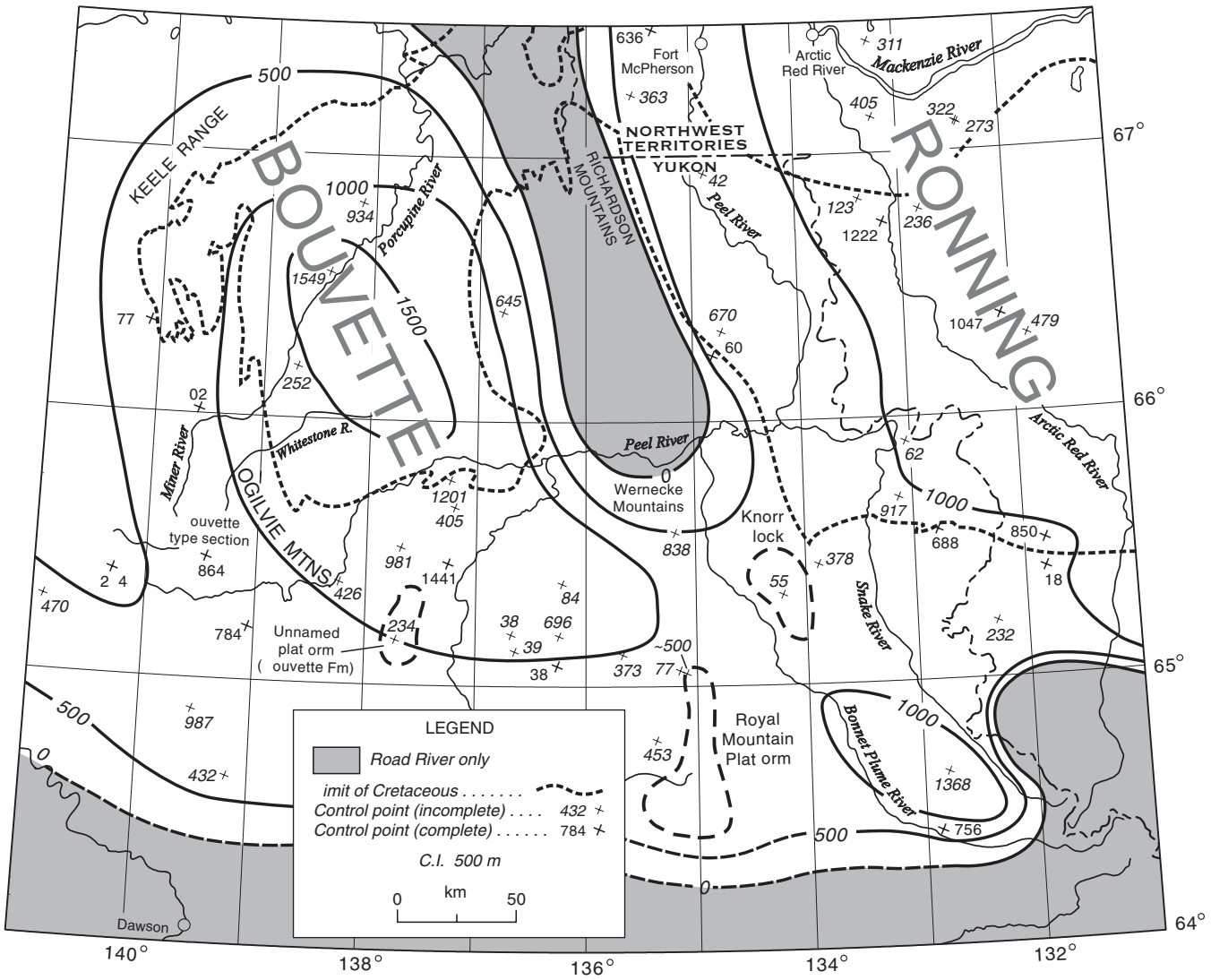


Figure 15. *Isopach map of the Ronning Group and the Bouvette Formation. reas occupied solely by shales of the Road River Group are shaded. Contour interval = 500 m.*

(Fig. 15). The contours shown in Figures 15 and 16 are necessarily highly interpretive because there are few outcrop or well sections that contain complete Ronning Group.

Franklin Mountain Formation

Definition and age. Pugh (1983) and Cecile and Norford (1992) reviewed the history of the Franklin Mountain Formation as a formal stratigraphic unit and the reader is referred to these publications for a complete historical review of the development of concepts regarding the formation. The name Franklin Mountain was first applied by Williams (1922) to an outcrop sequence of shaly carbonates separating the Saline River Formation below from the Mount Kindle Formation above at Mount Kindle in the south-central part of the Mackenzie Mountains. Norford and Macqueen (1975) redefined the Franklin Mountain Formation at the Mount Kindle type section and described its regional development throughout the Mackenzie Mountains and the adjacent Interior Plains, informally known as the Mackenzie Corridor. They subdivided the Franklin Mountain dolostones into three distinct subunits: a lower cyclic unit, a middle rhythmic unit and an upper cherty unit. In the type region, the cyclic unit is characterized by repetitive bedding cycles in which intervals of light grey finely crystalline dolostone alternate with yellowish orange, argillaceous, platy dolostone intervals, and ranges in thickness from about 50 to 150 m. The rhythmic unit is characterized by a striped weathering pattern caused by regular alternations of intervals of finely crystalline, commonly oolitic, brownish grey to light brown dolostone interbedded with intervals of very finely crystalline, greyish brown, silty dolostone that may be capped with flat-pebble

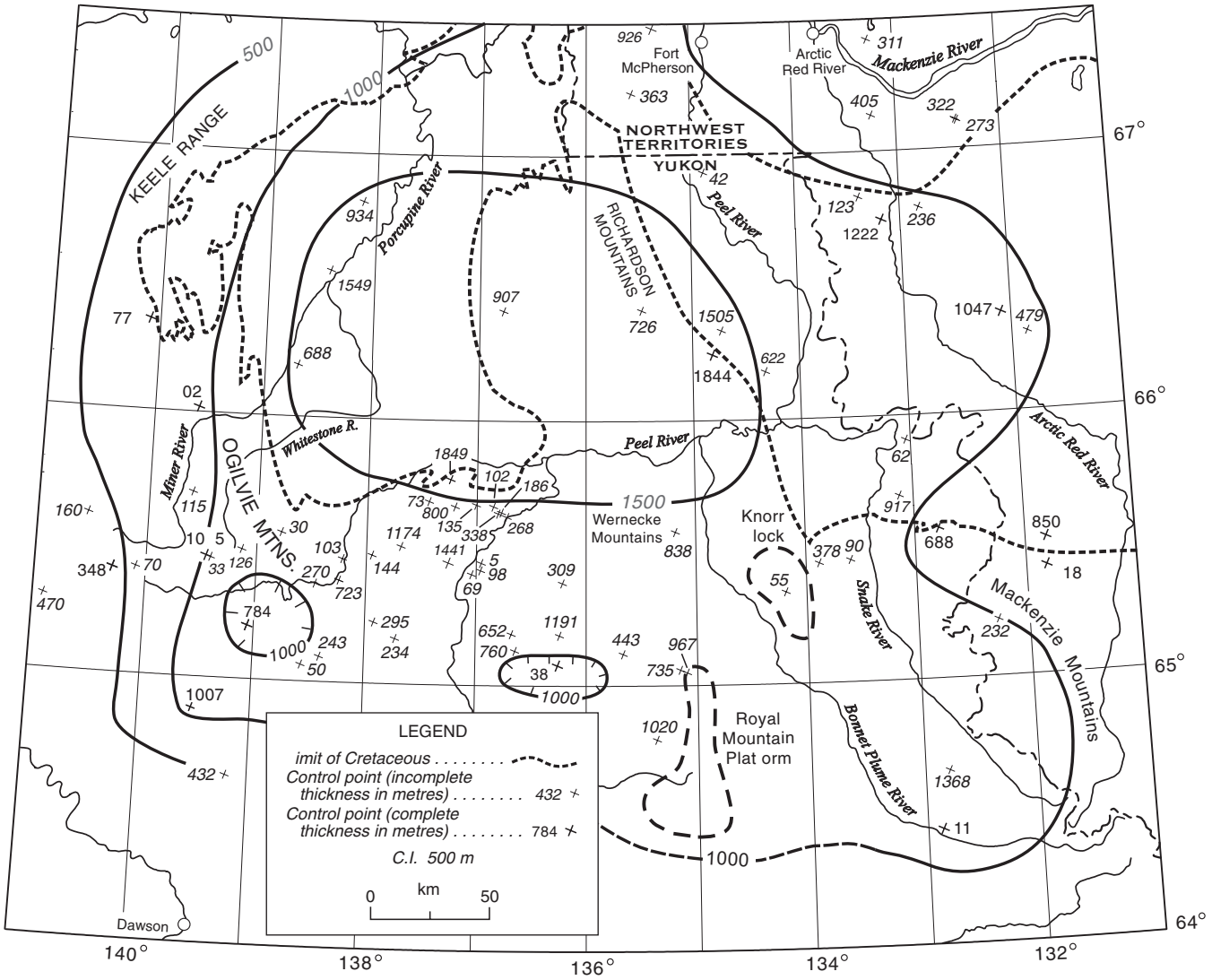


Figure 16. *Isopach map of the Ronning Group and its lateral age-equivalents in the Road River Group. The contour interval is 500 m. Only 14 complete sections of this interval occur within the study area.*

conglomerate. Complete sections of the rhythmic unit range in thickness from about 150 to 500 m in the type area. The cherty unit, overlying the rhythmic unit, is a distinctive light grey, thick bedded, finely to coarsely crystalline dolostone containing abundant light and dark grey chert masses, drusy quartz and some silicified stromatolites and oolites. It ranges in thickness from about 200 to 700 m (Norford and Macqueen, 1975).

The work of Norford and Macqueen (1975) provided the foundation for later studies that extended the Franklin Mountain Formation beyond its type area toward the northern part of the Mackenzie Mountains (e.g., Aitken et al., 1973, 1982) and into the subsurface of the Anderson and Peel plains (Pugh, 1983, 1993). In addition to the three units of Norford and Macqueen (1975), Pugh (1983) also mapped a dolomite unit above the cherty unit following the identification of this subunit of the Franklin Mountain by MacKenzie (1974) at the Tenlen Lake A-73 well, east of the study area. Pugh (1983) recognized this subdivision, as well as the Franklin Mountain subdivisions of Norford and Macqueen (1975) as informal members, and extended the Franklin Mountain Formation westward across Richardson Trough and into Eagle Plain and the Ogilvie Mountains (i.e., Yukon Stable Block).

The age of the Franklin Mountain Formation in its type area ranges from Late Cambrian to Early Ordovician, based on very few faunal collections (Norford and Macqueen, 1975). One collection from near the top of the Franklin Mountain Formation at Section 44 (MTA-82-9) yielded a probable Early Ordovician age (Appendix 6). This is consistent with the age of the upper part of the Franklin Mountain in its type area. Franklin Mountain strata at

Section 44 are atypical, totally subtidally deposited (possibly on the upper part of a basin slope leading toward Richardson Trough) argillaceous fossiliferous limestones. However, these strata are demonstrably mappable as facies equivalents of Franklin Mountain strata farther east and are overlain by strata of the Mount Kindle Formation (Fig. 9; Norris, 1982d).

Distribution, thickness and contact relations. The distribution of the Franklin Mountain Formation in this study is restricted to the Peel and Anderson plains and the Mackenzie Mountains. Norford (1997) noted previously the considerable differences that exist between strata of the Ronning Group east of Richardson Trough and strata included in the Ronning Group (Franklin Mountain and Mount Kindle formations) of Pugh (1983) west of the trough. A large tongue, or body of Middle Ordovician to Early Silurian Road River shale that lies stratigraphically between Cambrian–Ordovician and Devonian carbonates occupies most of the Yukon Stable Block area west of the trough (Fig. 9, 14) and was largely included within the Ronning Group of Pugh (1983). This shale mass has no counterpart within the Ronning Group east of the trough. Consequently, as discussed previously, the distribution of the Ronning Group, and the Franklin Mountain Formation itself as part of the Ronning Group, are restricted to regions east of Richardson Trough.

No attempt has been made to generate an isopach map of the Franklin Mountain Formation within the study area because of the paucity of complete well or outcrop sections. The thickness of the Franklin Mountain ranges from 375 m to a maximum of 779 m in the two complete outcrop sections and four complete well sections (Appendices 1, 3). The Franklin Mountain Formation maintains an approximately constant thickness in a north–south direction in the Interior Plains (Fig. 10, 11) but there is some indication that it thins slightly to the west or southwest, toward Mackenzie–Peel Arch and the Knorr Block, where measured Franklin Mountain outcrop sections are slightly to moderately thinner than their subsurface counterparts in wells immediately northeast of the mountain belt (Fig. 17, 18; see also Fig. 7 in Pugh, 1983).

It could not be determined if there are any strata equivalent in age to the Franklin Mountain Formation on the Knorr Block itself. The cherty dark dolostones of unit 1 in Section 22 that rest directly on orange weathering Precambrian dolostones and quartzarenites of the "Knorr Block Succession" of Norris (1982d) resemble unit 1 of the Mount Kindle Formation in Section 19 (MTA-82-6) about 70 kilometres east-southeast of Section 22. This very distinctive basinal facies of dark brownish grey, cherty and platy dololaminite and thin bedded dolomite with abundant potato-shaped chert nodules has been mapped throughout the south and central Mackenzie Mountains as the Whittaker Formation and is considered to be the basinal facies equivalent of the Mount Kindle Formation (Cecile and Norford, 1992). If unit 1 of Section 22 is, in fact, a basinal facies equivalent of the Mount Kindle, then Franklin Mountain strata are not present across at least part of the Knorr Block.

East of the Knorr Block (Fig. 9), and across the Mackenzie–Peel Arch east of the study area (Fig. 3), Franklin Mountain strata rest unconformably on Proterozoic rocks (Cecile and Norford, 1992). Farther northeast, across the Mackenzie–Peel Shelf, Franklin Mountain dolostones conformably overlie Cambrian strata of the Saline River Formation. The unconformity beneath the Saline River and that beneath the Mount Clark and Mount Cap formations in the eastern part of the Mackenzie–Peel Shelf merge southwestward with the sub-Franklin Mountain unconformity (Fig. 10; Aitken et al., 1973).

The upper contact of the Franklin Mountain with the Mount Kindle Formation is a regional unconformity that decreases in magnitude westward (Aitken et al., 1973; Cecile and Norford, 1992, 1993; Norford and Macqueen, 1975). It has been suggested that the sub-Mount Kindle unconformity is the upper bounding unconformity of the Sauk Sequence in the District of Mackenzie, separating the interregional Sauk Sequence from the overlying Tippecanoe Sequence (Cecile and Norford, 1993). Other authors (Aitken, 1993) regard the top of the Sauk Sequence to be within the upper part, rather than at the top of, the Franklin Mountain.

Lithology and internal markers. The Franklin Mountain Formation mapped in the subsurface of the Peel and Anderson plains in this study is essentially the same as that mapped by Pugh (1983). Subunits within the Franklin Mountain have not been mapped systematically because of the sparse well control, although they are shown in Figure 11. Lithological logs of the sample cuttings are required to identify the presence of these members, although the lowermost member, the cyclic unit, can be identified by the abundance of interbedded, thin, argillaceous and silty horizons on gamma ray-sonic logs (Fig. 11). As Norford and Macqueen (1975, p. 9) noted, the progressive westward loss of silica within the cherty unit and the disappearance of bedding cycles in the rhythmic unit render these subdivisions of the Franklin Mountain much less distinct west of the type region. This is true also in the subsurface of the Anderson and Peel plains where the normally very recognizable cherty unit is less well developed and has rather indeterminate upper and lower contacts with the overlying Dolomite Member and underlying Rhythmic Member (Pugh, 1983). However, there is a distinctive, mid-Franklin Mountain log-based marker (Fig. 11). It is not known if this marker occurs precisely at the top of the Rhythmic Member but it could at least be regarded as indicating the approximate top. As Pugh (1983) noted, the Cyclic Member can be mapped over most

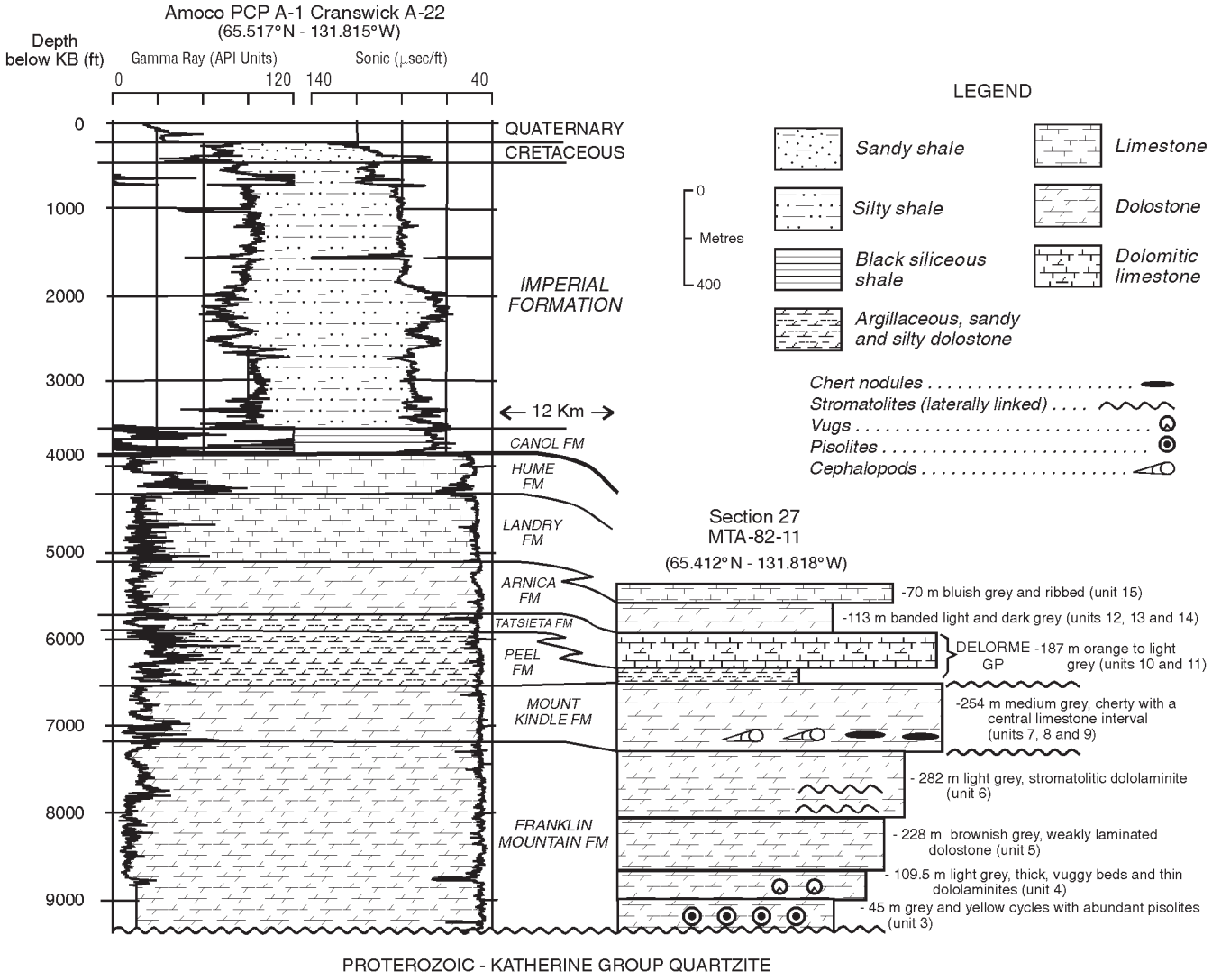


Figure 17. *Surface to subsurface correlation between the lower Paleozoic in Section 27 (MTA-82-11) and that in the nearby Amoco PCP A-1 Cranswick A-22 well in the Snake River map area (106F) on the Peel–Mackenzie Shelf. The Delorme Group is readily divisible into the Tatsieta and Peel formations.*

of the area east of the Richardson Mountains as an argillaceous basal zone. However, even these basal interbedded siliciclastics disappear close to Richardson Trough and the Knorr Block, as, for example, in the Gulf Mobil Caribou YT N-25 well on the east flank of Richardson Trough (Fig. 19) and in the Franklin Mountain of Section 44 (MTA-82-9) near the east side of the Knorr Block (Fig. 9).

Within the study area, the Franklin Mountain Formation is almost entirely a homogeneous light brown or tan, finely crystalline dolostone with scattered intervals containing moderate amounts of white and grey chert. Only the lowermost Cyclic member is a distinctively more argillaceous yellow dololaminite. Franklin Mountain strata in the Mackenzie Mountains outcrop belt, near the Knorr Block, contain abundant, distinctive pisolites in thin lenses and bands near the base of the formation and abundant intervals of laterally linked hemispheroidal stromatolites in the lower and upper parts of the formation (Sections 27 and 44 in Figure 9; see Appendix 5).

The Franklin Mountain Formation within a few kilometres of Richardson Trough and the Knorr Block display atypical lithologies. Franklin Mountain strata in Section 44, about 25 km directly east of the Knorr Block, is dominantly limestone (Fig. 9). In this section, the lowermost unit is pisolitic and oncolitic dolostone, but the overlying units are argillaceous limestones, dominantly thin to medium bedded skeletal wackestones, containing horizons with abundant marine faunas (gastropods, trilobites, brachiopods and crinoids).

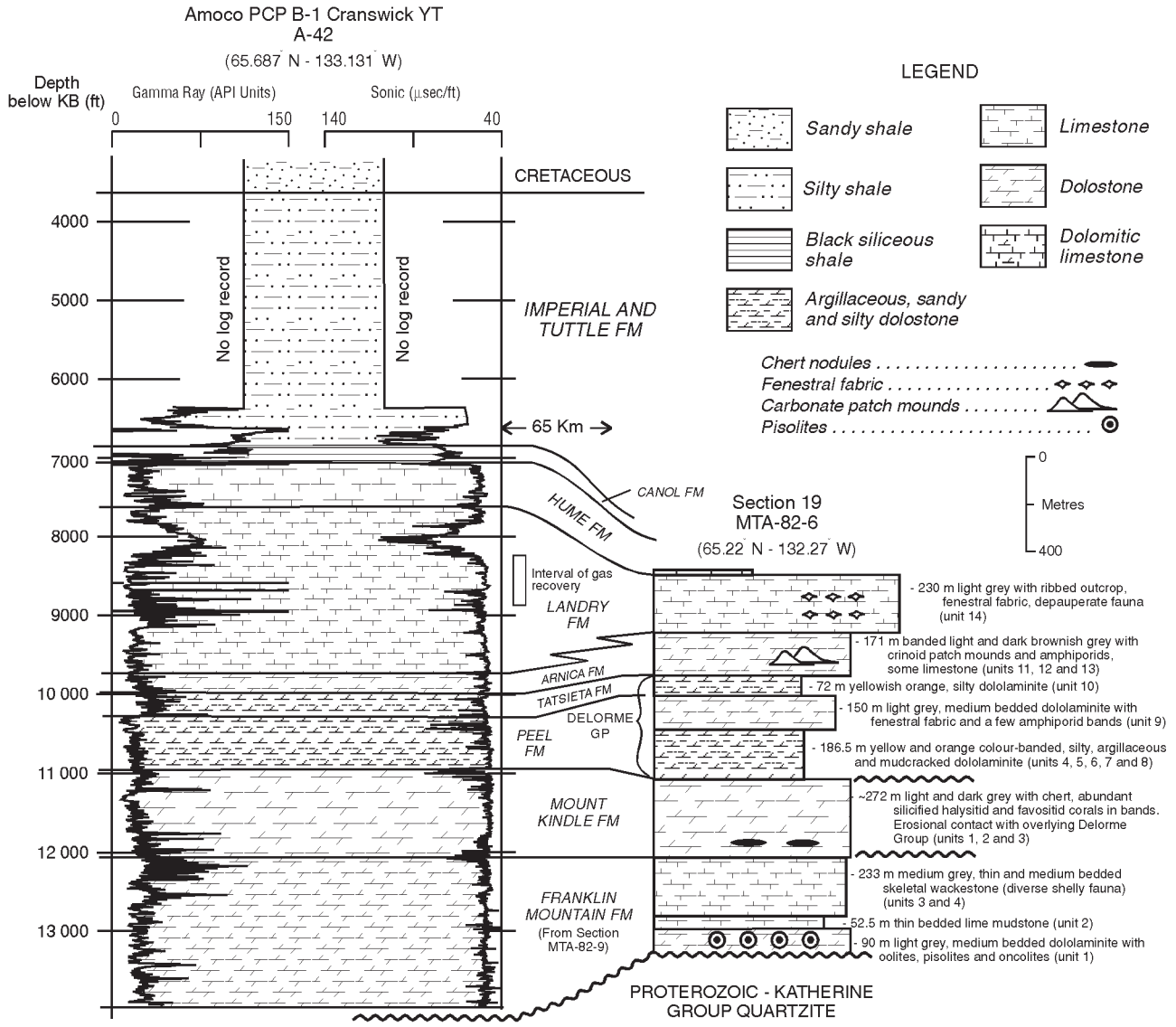


Figure 18. *Surface to subsurface correlation between the lower Paleozoic in Section 19 (MTA-82-6) and in the nearby Amoco PCP B-1 Cranswick YT A-42 well in the Snake River map area (196F) on the Peel–Mackenzie Shelf. The Delorme Group is readily subdivided into the Peel and Tatsieta formations in both surface and subsurface sections.*

Southeast of the Knorr Block and Richardson Trough, and on the unnamed salient of lower Paleozoic platform carbonates that separates Misty Creek Embayment from Selwyn Basin and Richardson Trough, the Franklin Mountain Formation is almost entirely peritidal, light yellowish grey dolostone and dololaminite containing abundant stromatolites and well developed fenestral fabric, as in Section 1 (MTA-82-7) of the Nadaleen River map area (Appendix 5). The uppermost unit (unit 5) of this section contains abundant, extensively silicified stromatolites. This unit may be correlative with the Cherty Member, or cherty unit of Norford and Macqueen (1975). The Franklin Mountain strata described in Section 4 of Cecile (1982, appendix 1) in the northeast corner of the Nadaleen River map area is closely comparable to Section 1 of this study. The Franklin Mountain Formation in these more southerly sections appears to resemble Franklin Mountain strata at the type area more closely than do Franklin Mountain strata farther north, in the Anderson and Peel plains.

Depositional setting. The Franklin Mountain Formation within the study area is mainly a peritidal sequence. Outcrop sections provide most of the data for determination of depositional setting because of the paucity of subsurface information. The alternation of medium grey dolostone intervals containing pisolitic lenses and rip-up clasts of yellow dololaminite with intervals containing laterally linked hemispheroidal stromatolites and yellow dololaminite in the lower parts of measured sections, such as in unit 3 of Section 27 (MTA-82-11 in Appendix 5; Fig. 9A) is indicative of peritidal deposition.

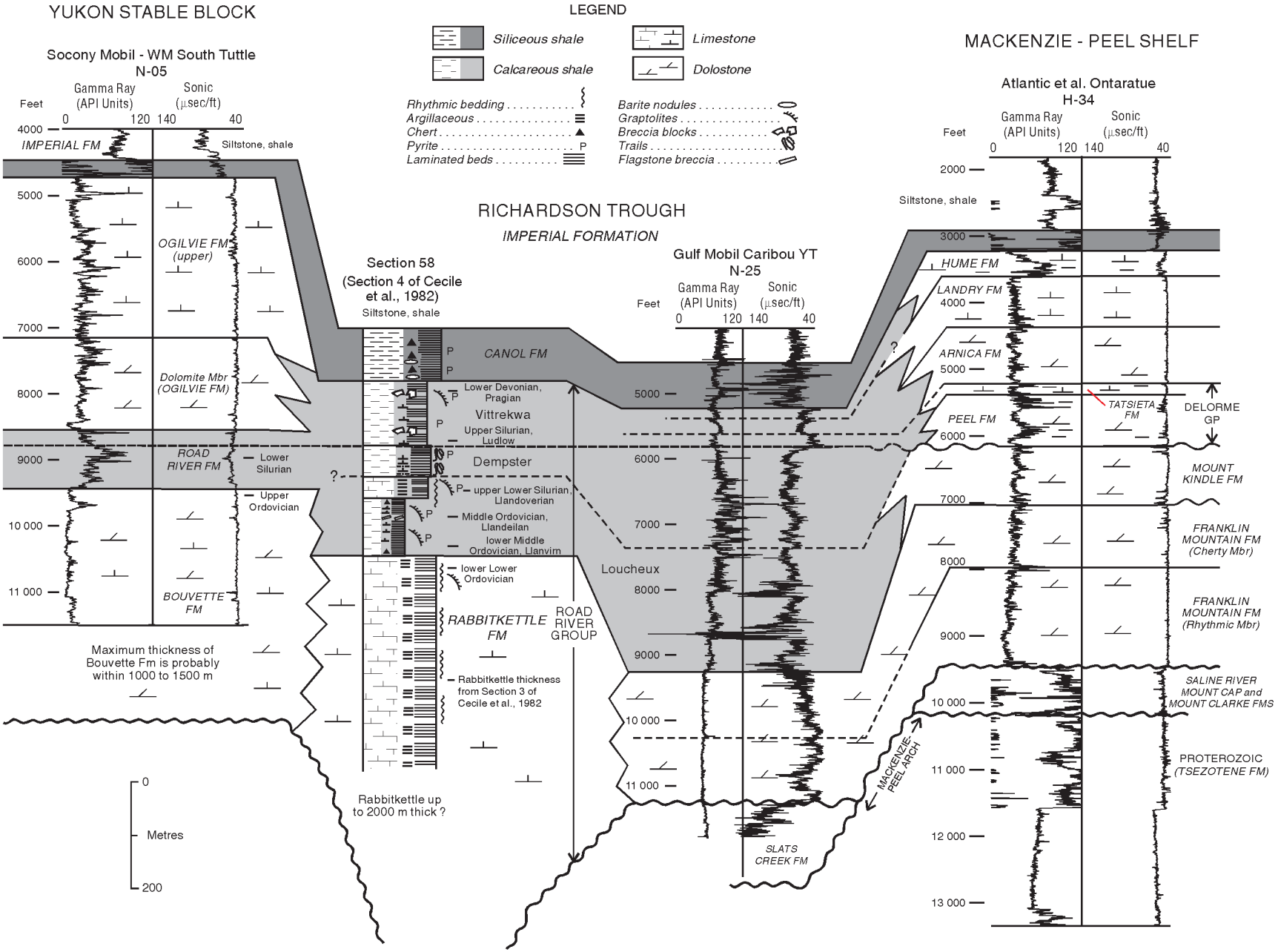


Figure 19. *An east–west cross-section of lower Paleozoic strata across Richardson Trough (see Fig. 6). Informal subdivisions of Cecile et al. (1982) within the Road River Group have been correlated tentatively with their shelf-deposited equivalents.*

In this same section, unit 4 contains alternations of thin to thick bedded dolostones with abundant, possibly biogenic vugs and finely comminuted skeletal material, which in turn passes upward to unit 5, formed of medium bedded, faintly crosslaminated dolostones and darker brownish grey dololaminites. Unit 4 probably represents the shallow subtidal to peritidal deposits of the Rhythmic Member. Unit 5 contains no discernible fauna, but its darker colour, crossbedding, and absence of bedding cycles may indicate slightly deeper water, dominantly subtidal deposition. Unit 5 may be age-equivalent to the middle or upper part of the Rhythmic Member.

The uppermost unit in this section, unit 6, bears some lithological similarity to the lowermost unit. Like unit 3, unit 6 contains yellowish argillaceous partings and yellowish grey dololaminites with intervals of laterally linked stromatolites. This thick unit may be equivalent to the upper part of the Rhythmic Member and the Cherty Member of the Franklin Mountain in the type area, and of the Upper Dolomite member of the Franklin Mountain mapped by Pugh (1983) in the subsurface of the Peel and Anderson plains. However, the absence of any intervals with abundant chert in this section makes identification and correlation of these upper members within the Franklin Mountain Formation problematic in this area.

The lithologies, bedding styles and sedimentary structures in Section 27 are most consistent with peritidal deposition during marine transgression that inundated a subaerially exposed land surface underlain by Precambrian and Cambrian strata. After this transgression advanced across the sub-Franklin Mountain unconformity and deposited peritidal sediments (e.g., unit 3), water depths may have become slightly deeper, and dominantly shallow-subtidal, darker sediments of the Rhythmic Member and its equivalents were deposited. The recessive, thin bedded, platy yellow stromatolitic dololaminites at the top of unit 6 may represent a return to shallower water and peritidal conditions. This relative drop of sea level near the top of the Franklin Mountain Formation in this section may have presaged the period of subaerial exposure that occurred in Middle Ordovician time, prior to deposition of the overlying Mount Kindle Formation (Norford and Macqueen, 1975; Cecile and Norford, 1992).

The argillaceous skeletal wackestones of the Franklin Mountain Formation near Richardson Trough probably reflect more open, deeper-water subtidal deposition on the flanks of the trough. Near the centre of the trough, basal strata of the Road River Group that are approximately age-equivalent to the Franklin Mountain, are deeper water, subtidal, argillaceous limestones (Section 4 of Cecile et al., 1982). Cecile et al. (1982) applied the name Rabbitkettle Formation to these strata. Similar homotaxial strata within the Road River Group in Misty Creek Embayment (Fig. 3) had previously been assigned to the Rabbitkettle Formation (Cecile, 1982).

The thick development of stromatolitic beds near the top of the Franklin Mountain Formation in sections close to Misty Creek Embayment may indicate that the Mackenzie–Peel Shelf was a rimmed shelf (Read, 1985) with an abrupt shelf margin occupied by stromatolitic bioherms. However, if deposition did take place across a rimmed shelf, rather than a carbonate ramp (Read, 1985), then the shelf-edge slope break could not have been pronounced because there is no definite periplatform debris in the slope-deposited Franklin Mountain argillaceous limestones of Section 44 (MTA-82-9), near the Knorr Block. At a more detailed scale of mapping these Franklin Mountain limestones could probably be assigned to the Rabbitkettle Formation. Similar slope-deposited argillaceous, sporadically fossiliferous Franklin Mountain-equivalent limestones within the Misty Creek Embayment and in Richardson Trough have been assigned to the Rabbitkettle Formation (Cecile, 1982; Cecile et al., 1982).

Mount Kindle Formation

Definition and age. The Mount Kindle Formation was named by Williams (1922) for an estimated 150 m of Silurian "grey magnesian limestone" exposed at Mount Kindle near the southern end of the McConnell Range, near the town of Wrigley, N.W.T. Pugh (1983) and Cecile and Norford (1992) provided complete reviews of the history of the Mount Kindle Formation as a formal stratigraphic unit. As with the Franklin Mountain Formation, Norford and Macqueen (1975) provided the first detailed lithological description of the Mount Kindle Formation at its type section, in conjunction with information on its regional extent. They described three informal members at its type area. A basal recessive interval, 10 to 15 m thick, which consists of light grey to yellowish grey, argillaceous and silty, thin bedded dolostone with a flaggy parting, passes upward into a very resistant, 65 m thick middle unit of brownish grey, biostromal, vuggy, thin to thick bedded dolostone containing a moderate abundance of colonial and solitary corals. The upper unit is a slightly recessive, yellowish brown, microcrystalline dolostone that is thinner bedded than the middle unit and does not contain the abundance of large corals present in the middle unit (Norford and Macqueen, 1975).

Blusson (1974), Norris (1982d) and Aitken et al. (1982) mapped the Mount Kindle Formation throughout the southeastern part of the study area, most of which is part of the Mackenzie Mountains (see also Cecile, 1982). The formation in these map areas is more homogeneous and does not display well-defined internal subdivisions. Instead, it has been described as a greyish brown or brownish grey, finely

crystalline, thick to massive bedded, vuggy dolostone with distinctive grey and white chert nodules scattered throughout. A distinctive fauna, commonly silicified orthocone cephalopods, stromatoporoids and corals, including the easily recognized 'chain corals' *Halysites* and *Catenipora*, occurs throughout the Mount Kindle Formation of the northern Mackenzie Mountains (Aitken et al., 1982). This fauna is representative of the *Bighornia–Thaerodonta* fauna of Late Ordovician age that occurs within the lower and middle parts of the Mount Kindle Formation in its type area (Norford and Macqueen, 1975). More generally, this fauna is probably part of the 'Arctic Ordovician Fauna', widespread throughout Arctic and western Canada (Ludvigsen, 1975; Nelson, 1959).

Mappability of the Mount Kindle Formation in outcrop is based upon its dark weathering colour, resistance to weathering and generally fossiliferous character compared to the less fossiliferous and lighter coloured underlying Franklin Mountain strata and the overlying Delorme Group (Aitken et al., 1982). Pugh (1983) described Mount Kindle strata in the subsurface of the Peel and Anderson plains east of 134° longitude as a lithologically uniform, brown to dark brown and buff, finely crystalline dolostone that is siliceous in places and with locally occurring pale coloured chert but very little regional variation.

The age of the Mount Kindle Formation in its type area ranges from Late Ordovician to Early Silurian (Norford and Macqueen, 1975). A firmly dated Late Ordovician fauna occurs 15 m above the base of the formation in Section 44 (MTA-82-9; Appendix 6; Fig. 9). This is the same age as the base of the Mount Kindle Formation in its type area hundreds of kilometres to the southeast. No other dated faunas were obtained in this study but Section 27 also contained faunas characteristic of the Mount Kindle Formation, such as orthoconic cephalopods. In the subsurface of the study area, faunas from the upper part of the Mount Kindle in the IOE Stony I-50 well yielded a Silurian age (Appendix 6, part 2).

Distribution, thickness and contact relations. The distribution of Mount Kindle strata in the study area is confined to the part east of Richardson Mountains (Fig. 3, 15). Like the Franklin Mountain Formation, and as discussed earlier, the Mount Kindle does not extend westward past the Richardson Mountains or across the Knorr Block onto the Yukon Stable Block (Fig. 15, 16).

Road River strata that are probably basinal facies equivalents of the Mount Kindle Formation directly overlie Precambrian strata on the Knorr Block (unit 1 in Section 22; Fig. 9A). The cherty dark dolostones in this unit resemble the cherty and platy dark dolostones of the Whittaker Formation, which is the basinal equivalent of the Mount Kindle Formation in the southern and central parts of the Mackenzie Mountains (see Ludvigsen, 1975). In sections along the east side of Misty Creek Embayment, Morrow (1991) found that strata identified as Mount Kindle Transitional (Cecile, 1982) were dark cherty dolostones and very similar to Whittaker strata mapped farther southeast. The possible presence of Mount Kindle-aged strata directly overlying Precambrian rocks on the Knorr Block implies nondeposition or erosion of Franklin Mountain-aged strata across the Knorr Block.

As with the Franklin Mountain Formation, no attempt has been made to generate an isopach map of Mount Kindle strata because of the paucity of complete sections. Only three complete outcrop sections (Appendix 1) and nine complete subsurface sections (Appendix 4) are known. Thicknesses range from about 200 m to a maximum of about 440 m. Over most of the eastern part of the study area, the formation is about 300 m thick (Fig. 10, 11) with a definite tendency to be thicker in western sections, such as at Arctic Red West G-55 (Fig. 10, 11).

In the type area of the Mount Kindle Formation, it unconformably overlies the Franklin Mountain Formation (Norford and Macqueen, 1975). In that region, light-coloured, silicified stromatolitic dolostones of the Franklin Mountain Formation are abruptly overlain by argillaceous, silty to sandy, greenish- and yellowish-grey dolostones of the thin basal member of the Mount Kindle Formation. These argillaceous basal beds can be identified consistently in the subsurface from gamma-ray logs in wells of the Peel and Anderson plains (Fig. 11). However, as Pugh (1983) noted, the Mount Kindle–Franklin Mountain contact is more difficult to determine in western wells, such as Arctic Red West G-55 (Fig. 10, 11). In these wells, the basal member is less readily distinguishable from the rather argillaceous upper Franklin Mountain beds. The base of the Mount Kindle is drawn at the base of the most pronounced excursion of the gamma ray log, which commonly coincides with a distinct, low-velocity "spike" on the sonic log. In outcrop, along the northern part of the Mackenzie Mountains in the Snake River map area (106F), dark brownish grey, cherty dolostones overlie more resistant, light grey, stromatolitic dolostones of the Franklin Mountain Formation with a sharp contact except near Richardson Trough, where Franklin Mountain strata are atypical limestones sharply overlain by Mount Kindle dolostones (Fig. 9).

The upper contact of the Mount Kindle Formation with the overlying Peel Formation of the Delorme Group is well defined in both outcrop and subsurface, and is part of the regional unconformity developed beneath the Delorme Group throughout northwestern Canada (Morrow, 1991; Pugh, 1983; Morrow and Geldsetzer, 1988, 1992). Bright orange, silty, recessive and platy dolostones of the Delorme Group (Peel Formation) overlie resistant, medium bedded, brownish-grey dolostones of the uppermost Mount Kindle Formation with a sharp but irregular contact (e.g., sections

19 and 27, MTA-82-6 and MTA-82-11; see Appendix 5 and Fig. 9) in the Snake River map area (106F). In the subsurface of the Anderson and Peel plains, the Mount Kindle–Peel contact is also well defined at the base of the shaly, light-coloured, very finely crystalline dolostone of the Peel succession by an abrupt decrease in the gamma-ray log intensity. In many wells there is a pronounced gamma ray "spike", decreasing in intensity westward, that marks the base of the Peel Formation (Fig. 10, 11).

Lithology and internal markers. In outcrop, the Mount Kindle Formation in the Snake River (106F) and Upper Ramparts River (106G) map areas is dominantly resistant, dark to medium brownish grey, finely to medium crystalline, medium to thick bedded, coralline and stromatoporoidal dolomite. Zones of abundant vugs occluded by white dolospar cement are scattered throughout. Typically, the lower part of the Mount Kindle is dark brownish grey, with prominent bands of silicified favositid- and halysitid-type corals. The upper part of the Mount Kindle is lighter in colour, with some yellowish grey to medium and light grey, slightly argillaceous, thin to medium bedded, finely crystalline dolostone and dololaminite intervals punctuated by thicker beds containing abundant silicified stromatoporoids. Crinoid ossicles are a common constituent throughout Mount Kindle strata. These subdivisions probably correlate respectively with the middle and upper members of the Mount Kindle Formation in the type area (Norford and Macqueen, 1975). The relatively thin, basal recessive member of argillaceous, silty dolostones that occurs in the type area is not seen in outcrop in the study area.

Dark brownish grey, thin bedded dololaminite or dark grey lime mudstone intervals containing abundant dark grey to black, bedding-parallel, potato-shaped chert nodules occur in several western sections close to the Knorr Block and Misty Creek Embayment (e.g., unit 1 of Section MTA-82-6 in Appendix 5). This distinctive lithology also occurs at the base of a sequence mapped as Road River Formation on the Knorr Block (Section 22, MTA-82-5; Fig. 9) where it rests unconformably on Proterozoic strata of the "Knorr Range Succession" (Norris, 1982c). These lithologies resemble strata mapped as Whittaker Formation (Douglas and Norris, 1961) in the southern Mackenzie Mountains. Strata of the Whittaker Formation are considered to be a basinal or basin slope equivalent of the Mount Kindle Formation (Ludvigsen, 1975; Morrow and Cook, 1987).

Mount Kindle strata exposed at Section 30 (MTA-82-4) contain an unusual proportion of white dolomite cement as the matrix in extensive zones with bodies of white-dolomite-cemented rubble packbreccias and floatbreccias of possible solution-collapse origin. Some Mount Kindle units in this measured section resemble the Presqu'ile Dolomite of the Pine Point area near Great Slave Lake. The upper contact of the Mount Kindle with the Delorme Group in this section is very irregular and marked by abundant, reddish, ferroan dolomite cement. This section is located immediately east of the Knorr Block in the Snake River map area (106F), and is in fact the westernmost outcrop section of the Mount Kindle formation. Like Section 44 (MTA-82-9) farther east (see Fig. 9), the Mount Kindle Formation in Section 30 also overlies an atypical Franklin Mountain sequence of argillaceous and fossiliferous limestones (Appendix 5).

Mount Kindle strata were penetrated in 16 wells within the study region. Of these, eight contain complete Mount Kindle sequences. Mount Kindle strata in most of these wells are similar to the Mount Kindle in outcrop. Surface to subsurface correlations are readily made between Mount Kindle strata along the northeastern margin of the Mackenzie Mountains and well sequences in the adjacent subsurface of Peel Plain (Fig. 17, 18).

A major facies variant occurs in wells near Richardson Trough, where Mount Kindle dolostones pass into fossiliferous lime mudstones and shaly limestones. Mount Kindle strata in the IOE Stony River I-50 and Union McPherson B-25 wells are typical of this variant of Mount Kindle strata, which is transitional to calcareous shales of the Road River Group exposed in the Richardson Mountains.

Cores of Mount Kindle strata were recovered from three wells. One of these cored intervals (6862-6882 ft.; 2091.5-2097.6 m) from the Amoco PCP A-1 Cranswick A-22 well falls within the middle member (Fig. 11) which has been tentatively identified as including strata between two marker horizons that may be correlated across the Peel and Anderson plains. The dark greyish brown, finely to medium crystalline dolostone containing crinoid and coral fragments, and calcite-cemented vugs in this cored interval are typical of the lower part of the Mount Kindle in outcrop. The cored interval in the Shell Tree River F-57 well (6125-6135 ft.; 1866.9-1869.9 m) is a similar, medium-brown dolostone and falls near or at the top of the middle member. Core (8940-8965 ft.; 2724.9-2732.5 m) from the IOE Stony River I-50 well is fossiliferous limestone of the atypical Mount Kindle facies.

Depositional setting. The abundant colonial and solitary coral and crinoid faunas in the lower part of the Mount Kindle Formation exposed in the Mackenzie Mountains portion of the study area indicate deposition in an unrestricted, open-marine shelf or ramp within the photic zone. The lower and middle members in the subsurface contain similar open-marine faunas and also reflect deposition in an open-shelf setting across the Mackenzie–Peel Shelf. Pervasive dolomitization has obscured original sediment textures of the interfossil matrix.

The thin bedded, dark, Whittaker-like, sparsely fossiliferous cherty limestones and dolostones interbedded with the more fossiliferous, thicker bedded dolostones in the lower part of the exposed Mount Kindle Formation east of the Knorr Block (Section 22 in Fig. 9A) indicate deeper water deposition below the photic zone and probably below mean wave-base. The presence of similar strata overlying the Precambrian Knorr Block succession may indicate that the Knorr Block itself was the site of deep-water deposition during shallow-water Mount Kindle deposition across the Mackenzie–Peel Shelf. Shaly limestones of the Mount Kindle Formation in wells near the Richardson Trough also indicate somewhat deeper water deposition, transitional to basinal Road River shales in the trough. There is no indication of the development of a shelf edge rim at any time during Mount Kindle deposition.

The numerous alternations of yellow dololaminite intervals with light grey, stromatoporoid-bearing beds of the upper member indicates dominantly peritidal deposition. The lateral continuity of this member probably indicates that it is a depositional package of peritidal sediments that accumulated in response to a shelf-wide change in sea level.

Bouvette Formation (ЄDb map unit), Jones Ridge Limestone, Vunta Formation and the Road River Group

The Bouvette Formation embraces all carbonate strata included in the ЄDb map unit of Operation Porcupine (Norris, 1985a). These strata were mapped westward from the Richardson Mountains to the international border between Yukon and Alaska (U.S.A.) and occupy almost the entire region designated as the Yukon Stable Block (Fig. 3). In northern Yukon, the Jones Ridge Limestone has been mapped in the extreme southwest corner of the Ogilvie River map area as the lateral equivalent of the Bouvette Formation (i.e., the ЄDb map unit of Norris, 1982a). The Jones Ridge Limestone is approximately age equivalent to the dominantly Cambrian- to Silurian-aged Bouvette Formation, and was mapped initially in a small region of northeastern Alaska around its type section at Jones Ridge, immediately west of the extreme southwest corner of the Ogilvie River map area (Brabb, 1967) in addition to the very small area in the southwest corner of the Ogilvie River map area.

The Bouvette Formation and Jones Ridge Limestone are both overlain by shales of the Road River Formation throughout most of their extent and, commonly, they unconformably overlie Precambrian strata (Norford, 1997; Blodgett et al., 1984; Fig. 9, 20). The upper part of the Bouvette Formation passes laterally eastward to shales of the Road River Group in Richardson Trough (Fig. 14). Road River shales form an easily mappable recessive band that separates resistant Cambro–Ordovician Bouvette carbonates from the resistant Devonian carbonates of the Michelle and Ogilvie formations. Road River shales extend across most of the Yukon Stable Block except for the region of Dave Lord High where Bouvette strata are overlain by brightly coloured silty carbonates of the Mount Dewdney Formation.

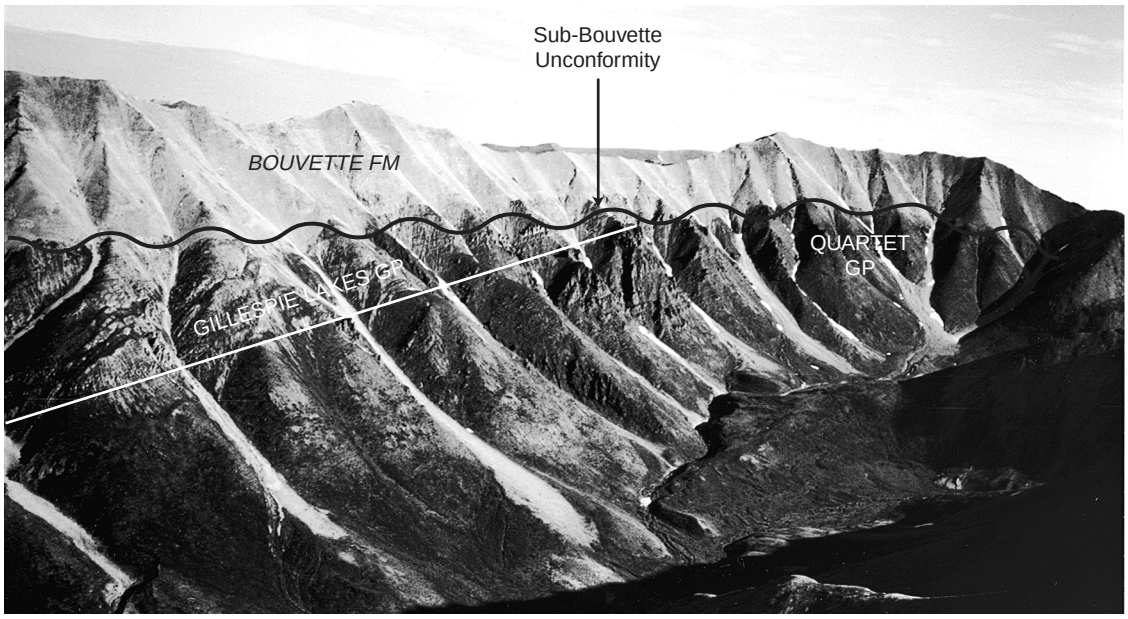


Figure 20. *View westward of light grey carbonates of the Bouvette Formation unconformably overlying Precambrian strata of the Gillespie Lakes and Quartet groups 7 km due west from Mount Klotz in the Ogilvie River map area (116G and 116F, E1/2) (GSC Calgary photo 4298-8.)*

The Vunta Formation is an Ordovician- and Silurian-aged limestone mapped in the White Mountains in the northeast part of the Bell River map area (Norris, 1981f), immediately northeast of the study area (Fig. 1). This formation and an underlying unnamed carbonate map unit, the C2 map unit, are the approximate age equivalents of the Bouvette Formation to the south and the Ronning Group to the east and southeast. The White Mountains constitute one of several lower Paleozoic inliers surrounded by upper Paleozoic and Mesozoic strata immediately north of Richardson Trough (Fig. 3). It is notable because it is the most northerly occurrence of lower Paleozoic platform carbonates in the northern Yukon, an area in which lower Paleozoic exposures are dominantly shales of the Road River Group. This has led to the recognition that the lower Paleozoic carbonates of the White Mountains were in fact deposited on an isolated platform separated from the shelf carbonates of the Mackenzie–Peel Shelf and from the Yukon Stable Block by basinal shales (Norford, 1964; Norris, 1985; Morrow, 1989). The White Mountains themselves form a notable physiographic feature in that, as their name implies, they are strikingly light grey to white and elevated compared to the greys and browns of the surrounding lower terrain.

Bouvette Formation (new formation)

Definition and age. The Bouvette Formation is a new formation name applied to a thick sequence of Cambrian to Devonian dolostones and limestones. Strata of the Bouvette Formation were mapped previously as the '$\in$Db map unit' throughout northern Yukon Territory, where they are exposed extensively throughout the Wernecke and Ogilvie mountains (Norris, 1985a; Norford, 1997; Fig. 9, 15, 20). This name is also applied here to correlative carbonates in the subsurface of Eagle Plain (Fig. 14, 21, 22). In outcrop, the Bouvette Formation is underlain by the Cambrian Taiga Formation, or by a variety of Proterozoic units, including the Gillespie Lakes and Quartet groups (Fig. 9). It is overlain by Road River shales, except in the region of the Dave Lord High (Fig. 3), where it is overlain by silty carbonates of the Mount Dewdney Formation (Fig. 22, 23).

The type section of the Bouvette Formation has been chosen at Section 36 (MTA-86-11, Appendices 1, 5; Fig. 6, 9), located very close to the geographic centre of the Ogilvie River map area. This is also within the central part of the regional distribution of this unit (Fig. 15). Section 36 was chosen as the type section because it is well exposed and accessible, with exposed upper and lower contacts.

This section extends southward from 65°34'34"N and 139°27'30"W across an unnamed mountain ridge north of Mount Gale, and continues south across the overlying Road River, Michelle and Ogilvie formations immediately east of the axis of the Gale Anticline (Fig. 24). The Bouvette Formation is named after Bouvette Mountain in the southeast part of the Ogilvie River map area about 30 km southeast of the type section. Bouvette Mountain is itself composed entirely of incompletely exposed strata of the Bouvette Formation. The name Bouvette Formation has the advantage of retaining the utility of the abbreviation '$\in$Db' for the $\in$Db map unit used on almost all maps of the Operation Porcupine region. This map unit can now be interpreted as indicating the map distribution of the Cambrian to Devonian Bouvette Formation. The Bouvette Formation is characteristically very resistant and forms broad, rather linear mountain ranges oriented parallel, or subparallel, to regional strike, particularly in the Hart River and Ogilvie River map areas (Fig. 25).

The Bouvette Formation at the type section is 864 m thick and includes units 2 to 6 inclusive of Section 36 (Appendix 5). Here, the Bouvette unconformably overlies unnamed, Proterozoic, pink and shaly siltstone (unit 1) which contains intercalations of greyish brown weathering, 3 m-thick quartzarenite sandstone, and conformably underlies shales of the Road River Formation. The lowermost beds (unit 2 - 96 m thick) are less resistant than the overlying, grey weathering strata and form less imposing, more discontinuous, yellowish grey weathering cliffs. These basal beds are composed of yellowish grey dololaminites containing lenses of mudchip breccias or conglomerates encased in orange, dolomitic quartzarenite siltstone. Bands of laterally linked hemispheroidal stromatolites are common and "teepee" structures (Flügel, 1982) were observed in dololaminite intervals. This lowermost, rather yellow- to slightly orange-weathering, basal unit of the Bouvette is very similar to and probably correlates with strata of the Taiga Formation developed beneath Bouvette strata farther east (Fig. 9), as discussed previously in the section entitled "Taiga Formation and equivalents".

Unit 3 (168 m thick) consists of 20 m thick intervals of medium to thick bedded, featureless or oolitic, finely crystalline, grey dolostone intercalated with 10 m thick intervals of yellow tinted dololaminite containing discontinuous beds, or lenses of beachrock-like intraclast (or mudclast) packstones or rudstone breccias and occasional mudcracks (Fig. 9, 26). Platy lithoclasts in these beachrock-like breccias or conglomerates tend to have an imbricated fabric. Individual lithoclasts may be reworked mudchips, although they may also be mudclasts reworked from shallow subtidal deposits. Spectacular bands of medium to thick bedded dolomitized oolite grainstone occur within the medium and thick bedded, dark grey dolostone beds throughout this unit (Fig. 9, 27). There is a definite rhythmic pattern of probable shoaling-upward cycles developed in unit 3, in which medium to slightly dark grey, thick bedded dolomitized oolitic and/or dolomitized skeletal? wackestone beds grade upward to light grey and yellowish grey

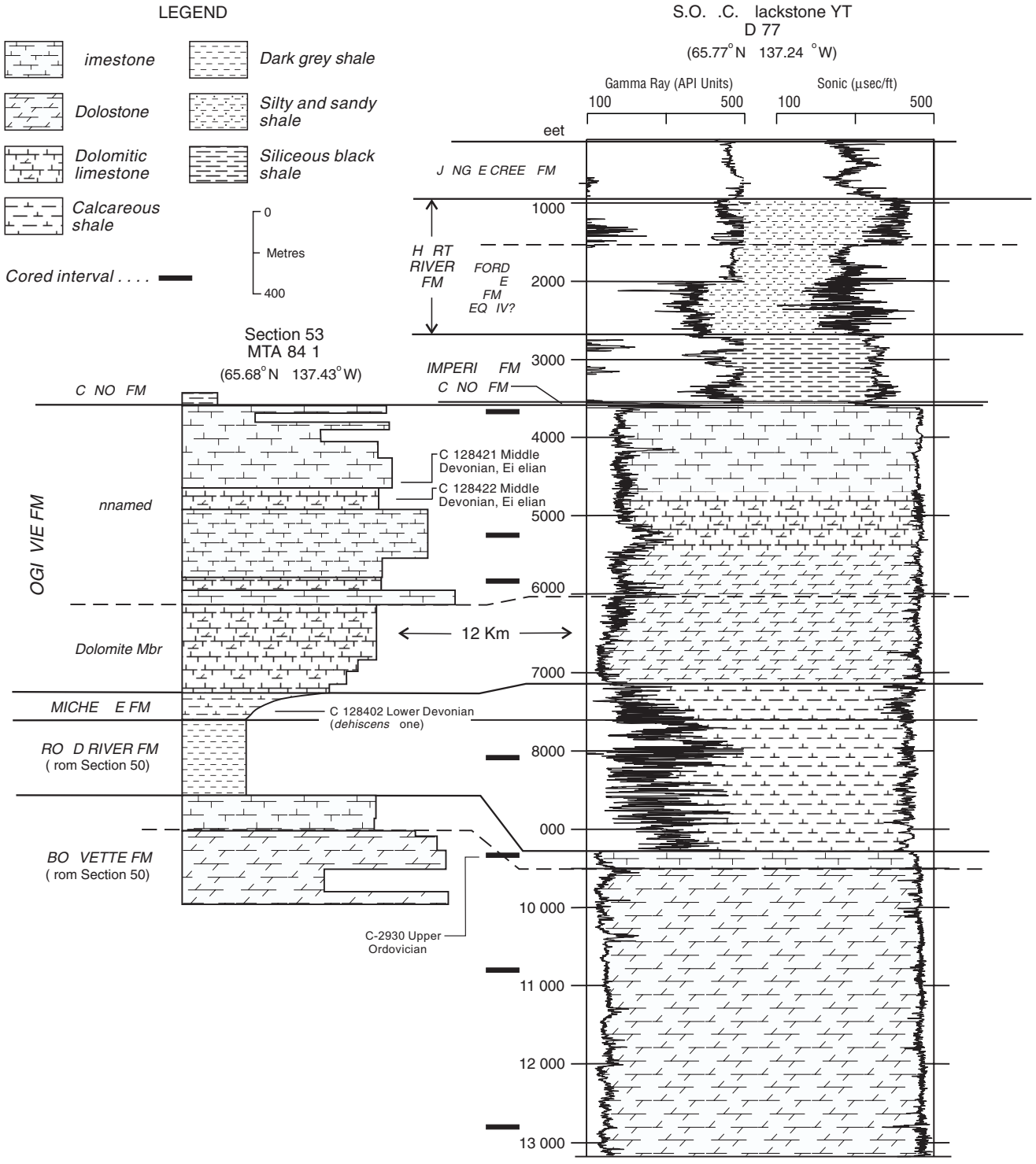


Figure 21. *Surface to subsurface correlation between lower Paleo oic strata in Sections 53 and 50 (MT -84-1 and MT -84-2) and that in the SOBC Blackstone YT D-77 well in the Hart River map area (116H) on the Yukon Stable Block. The Road River and Michelle formations separate carbonates of the ower and Middle Devonian Ogilvie Formation from carbonates of the underlying Cambrian to Ordovician Bouvette Formation.*

dololaminite intervals. Unit 4 (150 m thick) is similar to unit 3 but contains fewer and less prominent oolitic bands and fewer occurrences of mudchip breccias. Units 3 and 4 compose a dark band within the Bouvette Formation, which probably correlates with the lower dark band of the Bouvette Formation above the Taiga Formation farther east (see unit 3

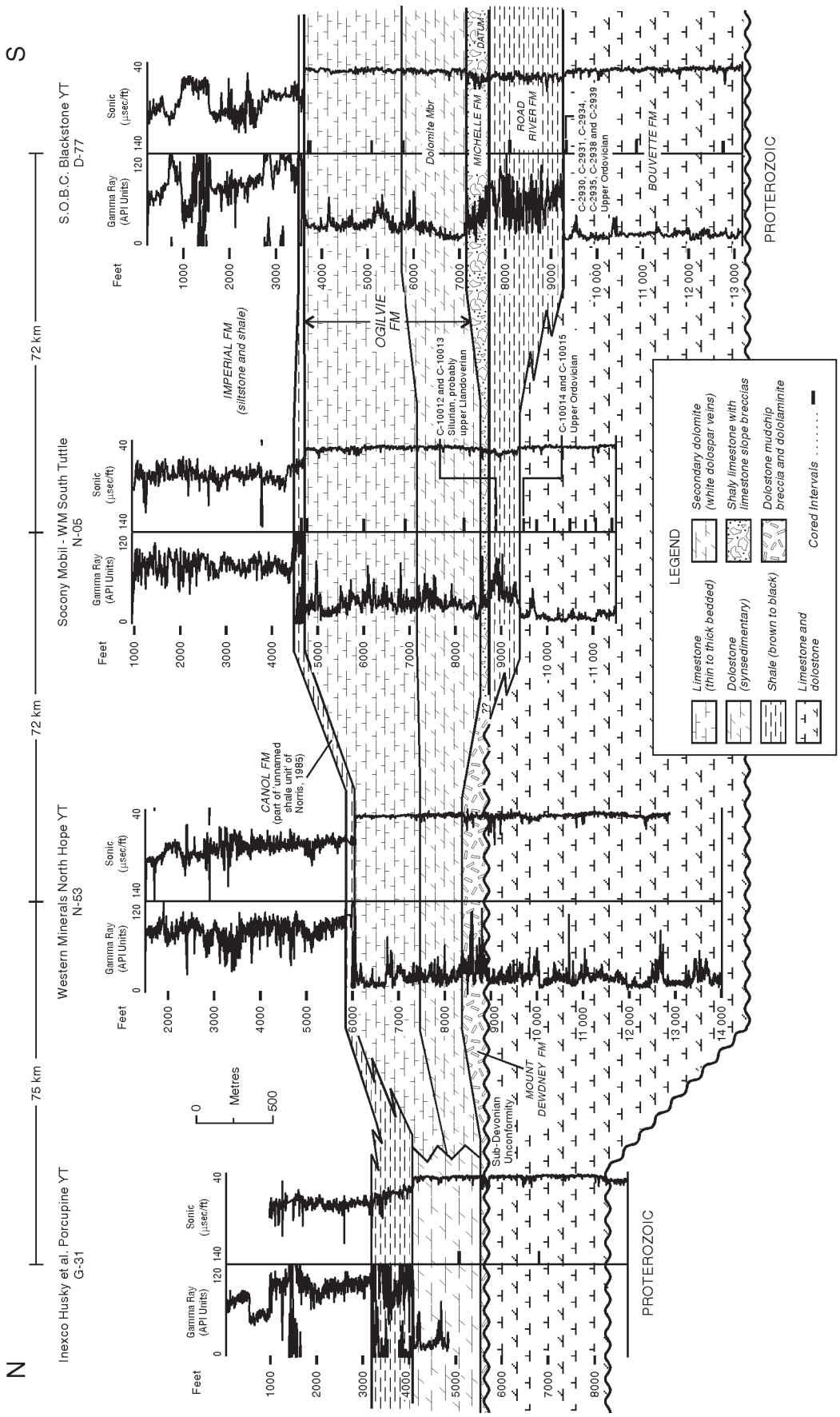


Figure 22. *A stratigraphic cross-section of lower Paleozoic strata beneath Eagle Plain (see Fig. 6). The transgressive–regressive cycle of deposition that characterizes strata of this age on Mackenzie–Peel Shelf is not evident here. The Ogilvie Formation in the Porcupine G-31 well at the west end of the cross-section has undergone late-stage dolomitization and contains abundant, white, sparry, fracture-filling, "saddle" dolomite.*

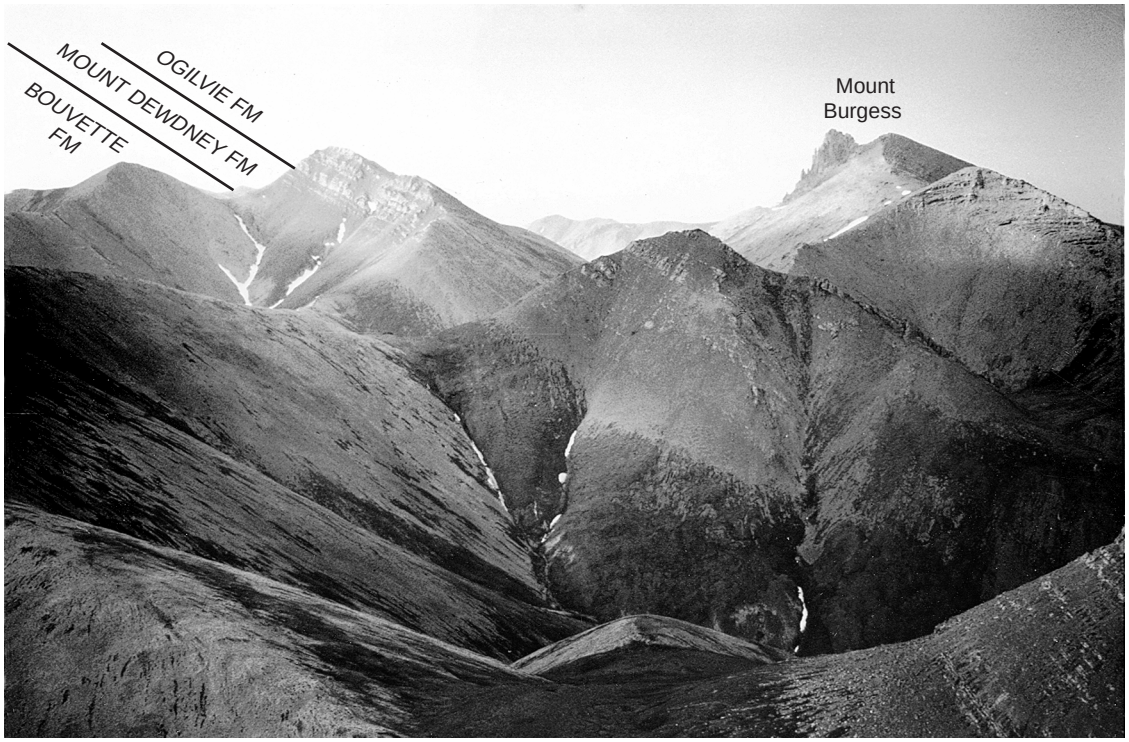


Figure 23. *View south from Section 56 (MTA-86-17) of the lower Paleozoic succession at Mount Burgess, where grey limestones and dolostones of the Bouvette Formation are overlain by the yellowish orange, silty dolostones of the Mount Dewdney Formation. These in turn, are overlain by the grey limestones of the Ogilvie Formation, which form most of Mount Burgess in the Porcupine River map area (116J and 116K, E1/2). (GSC Calgary photo 4298-6.)*

in Section 35, Appendix 5; Fig. 9). At the type section, units 2 to 4 extend uniformly southwest upslope, toward a long ridgeline that trends approximately southeast (Fig. 24).

Unit 5 is very resistant, 300 m thick and forms the lighter grey, middle part of the Bouvette Formation. It extends southeast and southwest across a long ridge crest bordering and immediately east of the axis of Gale Anticline (Fig. 24; Norris, 1982a). This unit is composed of thick to very thick bedded, cliff-forming intervals of vuggy, finely to medium crystalline dolostone separated by benches of light grey to white dololaminite. Fenestral fabric, particularly laminoid fenestral fabric (Tebbutt et al., 1965), is abundant in lighter grey intervals. Grey chert occurs sporadically in some darker grey beds. Unit 6 (150 m thick) is a light grey, resistant dolostone that extends across the southern end of the ridge line and continues down a dip slope to its upper contact with dark grey shales of the Road River Formation. It is composed of very thick to massive bedded, slightly vuggy, medium to coarsely crystalline dolostone, which is more massive bedded and recrystallized in the upper part of the unit. Coarsely crystalline white dolospar has partly occluded abundant macropores in bands near the top of the unit. Chert occurs as solid grey bands in the middle of the unit. This, and other sections of the Bouvette Formation across the study area are shown in Figure 9. Much of the exposed Bouvette Formation may be subdivided into units similar to those of the type section (Fig. 9). More generally, Bouvette strata may be subdivided into two parts: a lower, darker grey, slightly silty part containing abundant stromatolites, oolite bands, mudcracks and lenses of beachrock-type carbonate lithoclast breccias, such as units 2, 3 and 4 of the type section; and an upper, lighter grey part dominated by very thick bedded and vuggy intervals, such as units 5 and 6 of the type section. For example, the thick, but incompletely exposed Bouvette Formation at Section 35 may be roughly divided in this way.

Regional variations of Bouvette strata in outcrop include pelletal limestone sequences in the upper parts of some sections, particularly in the Wind River map area near the Knorr Block (Fig. 9, 21). Some incomplete sections that include only the upper part of the formation, such as at Royal Mountain (Section 13, MTA-82-1; in Appendix 5; Fig. 9), are entirely limestone. Bouvette strata proximal to a lateral transition to Road River shales also tend to be limestone, rather than dolostone. In the subsurface, Bouvette strata are mainly dolostone with some limestone intervals, particularly near the upper contact of the Bouvette with Road River shale (Fig. 21). Subsurface Bouvette strata near a lateral facies

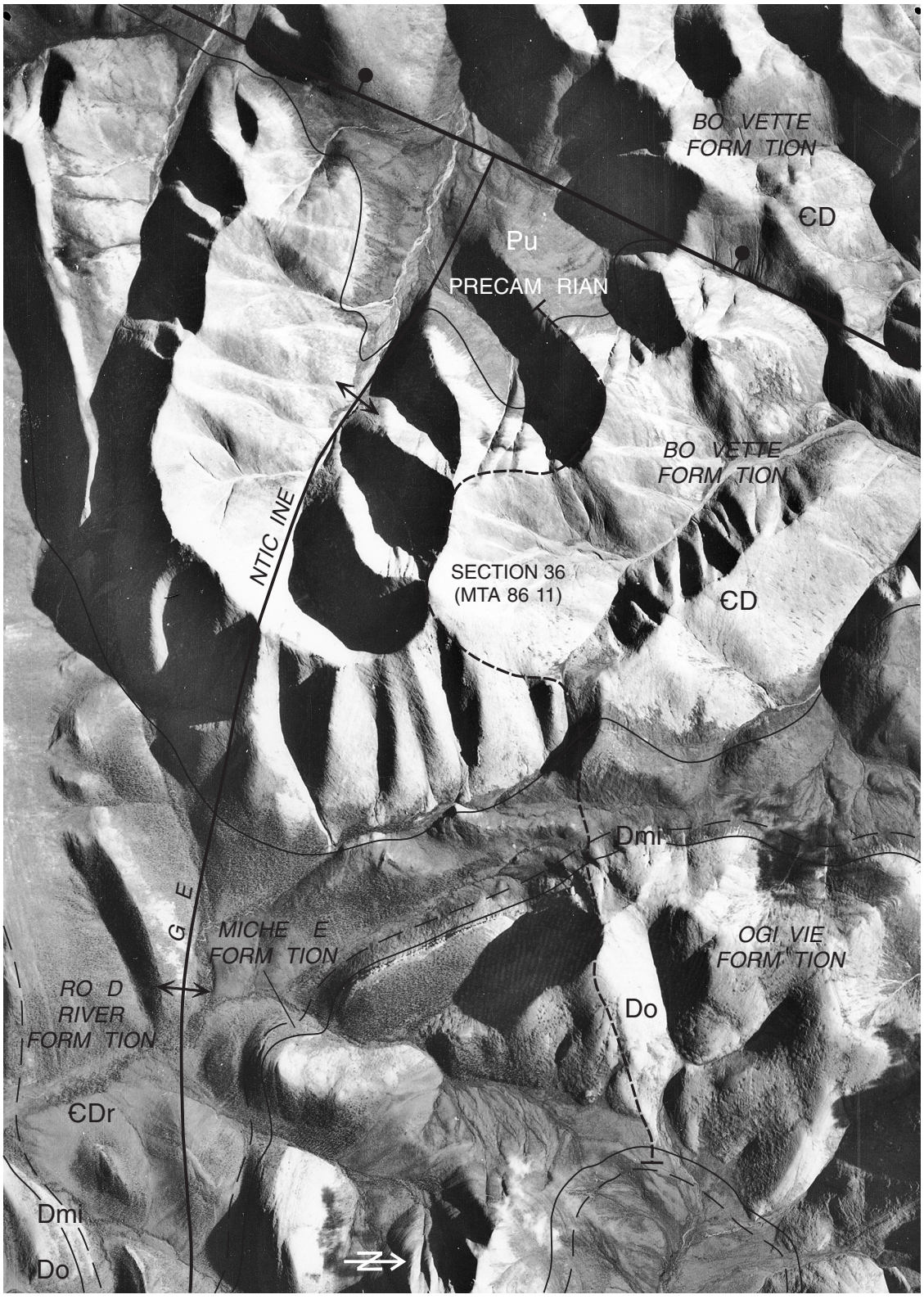


Figure 24. *n airphoto view of Section 36 (MT -86-11) in the central part of the Ogilvie River map area (116G and 116F, E1/2). It includes the type section of the Bouvette Formation (new) named after the prominent Mount Bouvette, which is formed entirely of the Bouvette Formation, and is located about 25 km southeast of this section and also in the Ogilvie River map area (irphoto number 14223-27).*

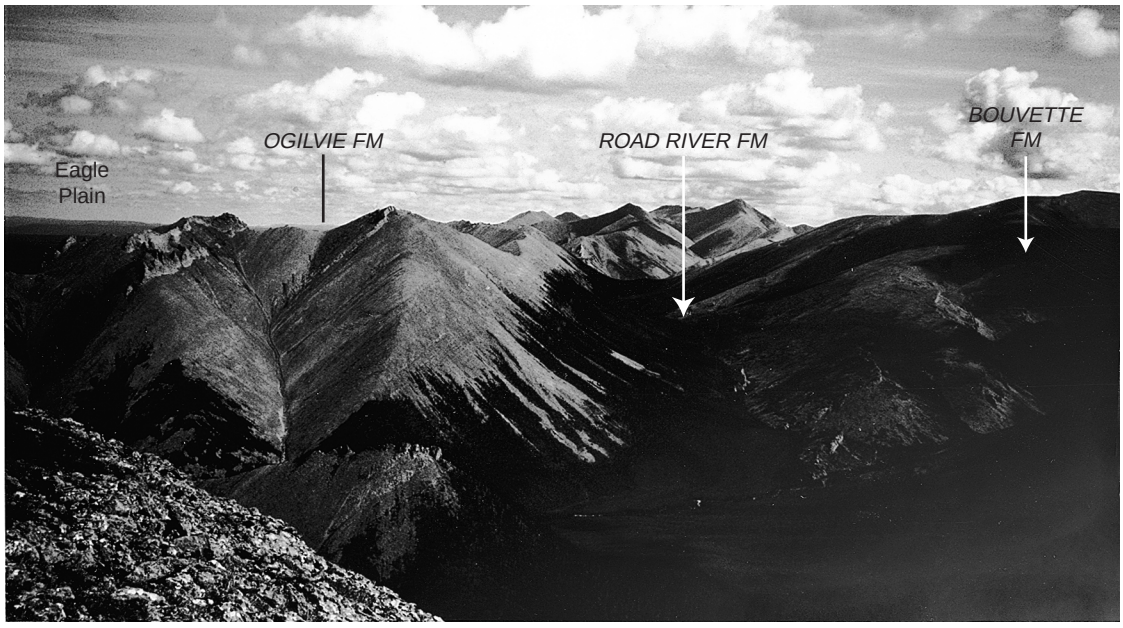


Figure 25. *View of the Bouvette, Road River, Michelle and Ogilvie formations at Section 53 (MTA-84-1) near Blackstone River in the Hart River map area (116H). Road River and Michelle strata underlie the vegetated valley floor, and grey carbonates of the Ogilvie Formation form the front range bordering Eagle Plain to the north (GSC Calgary photo 4298-14.)*

transition to Road River shale tend to be limestone rather than dolostone, in a manner similar to that observed in outcrop. Bouvette strata in the Socony Mobil Western Minerals South Tuttle N-05 well are mainly limestone, probably because of their close proximity to the Road River shale in Richardson Trough (Fig. 19, also compare Fig. 6 and 15).

The only complete subsurface section of the Bouvette Formation occurs in the Inexco Husky et al. Porcupine YT G-31 well where it unconformably overlies Proterozoic strata and is unconformably overlain by the Mount Dewdney Formation. Bouvette strata in this section are rather atypical because of their location within the area of the Dave Lord High, near the western edge of the regional extent of the formation (Fig. 3, 9, 15). Here, the Bouvette Formation is entirely dolostone, which is light brown and pelletal in the lower part and light grey and medium crystalline in the upper part. Fenestral fabric is abundant in core from the middle of the Bouvette Formation in this well (Fig. 28), in addition to some beachrock-type imbricated lithoclast breccias similar to those observed in outcrop in the middle and lower parts of the formation.

Bouvette strata in the SOBC Blackstone YT D-77 well comprise a subsurface reference section that is more typical, although the base of the Bouvette was not reached (Fig. 21). The lowermost two cores from the Bouvette Formation in this well are dolostone. The deepest core is light grey, finely crystalline dolostone, the next higher core is darker grey dolostone containing finely comminuted skeletal material. The highest core in Bouvette strata is from a limestone interval about 36 m thick that forms the top of the Bouvette. This core is a silicified skeletal wackestone containing coral fragments representative of the "Arctic Ordovician Fauna" and dated as Late Ordovician.

The age of the Bouvette Formation ranges from Cambrian to Devonian. The uppermost beds of the Bouvette are extremely diachronous and range in age from Middle Ordovician to Early Devonian (Fig. 9, 22). No faunas were recovered from basal Bouvette beds in this study. It seems likely, however that these beds are Late Cambrian in age (Norford, 1997; Fritz, 1997). The Road River Group in Richardson Trough is the lateral age-equivalent of the Bouvette Formation to the east. Westward, the Bouvette passes laterally into the Cambrian and Ordovician Jones Ridge Limestone of east-central Alaska (Brabb, 1967). Jones Ridge Limestone has also been mapped in the extreme southwest corner of the Ogilvie River map area (Norris, 1982a; see also Fig. 9).

Distribution, thickness and contact relations. The Bouvette Formation extends across the entire region of the Yukon Stable Block with an average thickness of approximately 1000 m (Fig. 3, 15). Over a broad region thicknesses range from 500 m to 1500 m. A maximum thickness of greater than 1500 m occurs in south-central Eagle Plain, around the Western Minerals North Hope N-53 well (Fig. 15). Thicknesses decrease uniformly away from this central thick

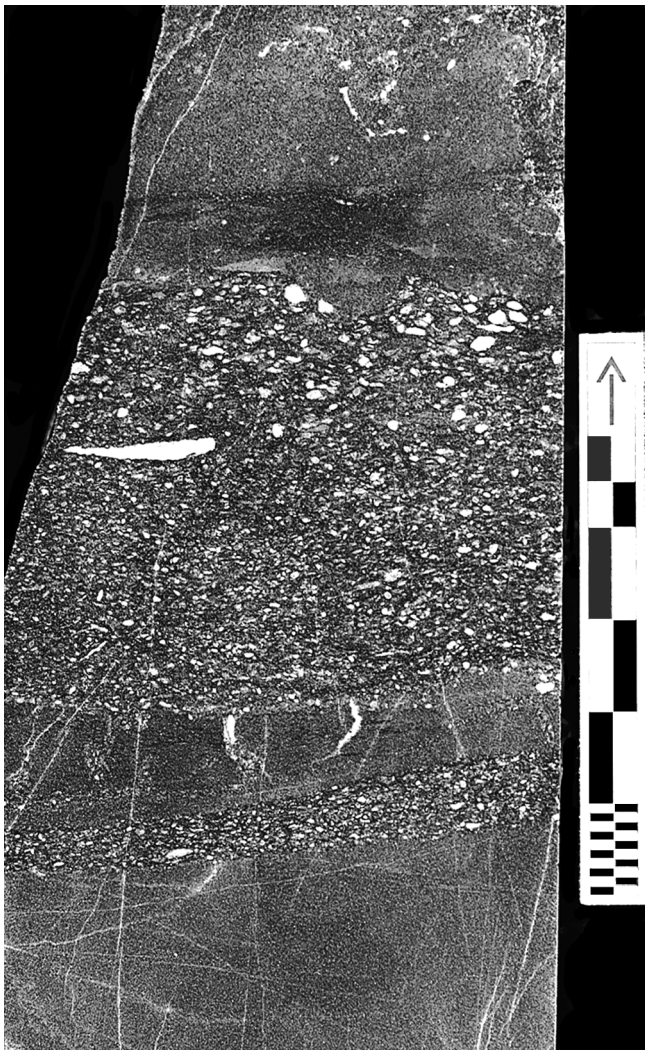


Figure . *Part of a stratigraphic lense of carbonate grainstone and pea-si ed gravel with reworked lithoclasts of dolomudstone of possible beachrock origin in the lower part of the Bouvette Formation in Section 6 (MT -86-11). (294 m above section base GSC Calgary photo 416 -22.)*

in a roughly "bullseye-like" pattern, except in the southeastern part of the Yukon Stable Block.

Two locally thick developments of the Bouvette Formation occur in the southeast part of the Yukon Stable Block. One of these is in the area of the Royal Mountain Platform of Norris (1985) in the Wind River and Nash Creek map areas, which contains Section 8 (MTA-82-1, Appendices 1, 5; Fig. 9, 15). The other, thicker development borders the west side of Misty Creek Embayment and is centred on Section 5 (MTA-82-17) in the Nadaleen River map area. The Cambrian- to Devonian-aged sequence of carbonates in this section has been assigned to the Franklin Mountain and Mount Kindle formations and to an unnamed Silurian–Devonian Carbonate map unit (Blusson, 1974; Cecile, 1982).

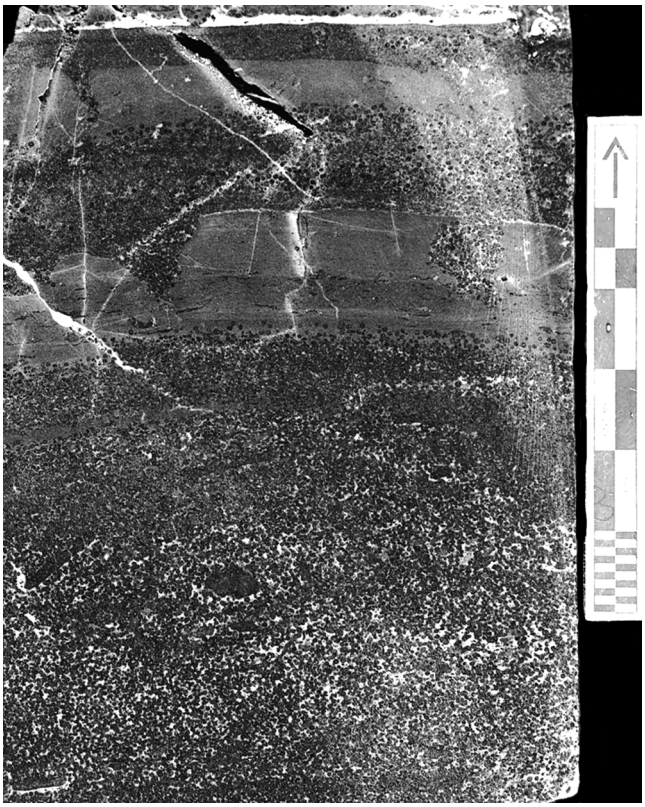


Figure 7. *Dolomiti ed oolite grainstone with mudcracked dolomudstone clasts in the lowermost part of the Bouvette Formation in Section 6 (MT -86-11). (unit , 180 m above section base GSC Calgary photo 416 -20.)*

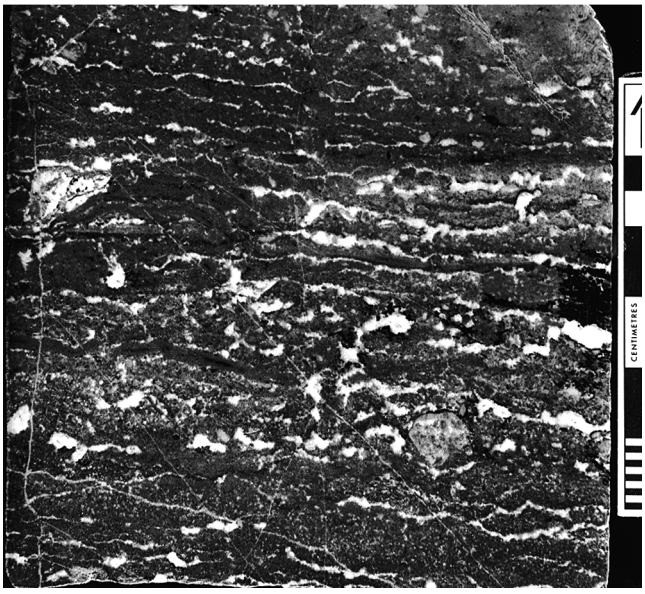


Figure 8. *Well developed laminar fenestral fabric in the lower part of the Bouvette Formation in the Inexco Husky et al. Porcupine YT G- 1 well (6800 ft. or 207 m below KB GSC Calgary photo 416 -10.)*

The lower Paleozoic nomenclature of these strata in the Nadaleen River map area is retained at this time. It is, perhaps, the only region where strata characteristic of the Mackenzie–Peel Shelf, the Franklin Mountain and Mount Kindle formations (i.e., Ronning Group), are overlain, or overlap with, strata more characteristic of the Yukon Stable Block. These Ronning Group strata are overlain directly by the Silurian–Devonian Carbonate map unit so that there is a continuous lower Paleozoic sequence of carbonate strata uninterrupted by the brightly coloured siliciclastics and carbonates of the Delorme Group. The absence of Delorme Group strata is more characteristic of the Yukon Stable Block. Consequently, the Silurian–Devonian Carbonate map unit of Blusson (1974) could be regarded as a tongue of the Bouvette Formation overlying Ronning Group strata in this area. More work in the Nadaleen River map area is necessary to document whether it is appropriate to formally assign strata of the Silurian–Devonian Carbonate map unit to the Bouvette Formation.

As previously discussed, the Bouvette Formation conformably overlies strata of the Taiga Formation in the southeastern part of the Yukon Stable Block. In the central and western parts of the Yukon Stable Block, the Bouvette unconformably overlies Proterozoic strata of the Quartet and Gillespie Lakes groups and undivided Proterozoic strata (Fig. 9, 20). Over most of the Yukon Stable Block, Bouvette strata pass conformably, and in some places gradationally, upward to shales of the Road River Formation (e.g., Section 16 in Fig. 9). In the northwest part of the Yukon Stable Block, in the region of Dave Lord High, Bouvette strata are overlain unconformably by brightly coloured silty dolostones of the Mount Dewdney Formation.

The upper part of the Bouvette Formation passes laterally eastward across a relatively narrow transition zone of dominantly pelletal lime mudstone and/or wackestone to shales of the Road River Group in Richardson Trough (Fig. 19). The lower part of the Bouvette passes eastward to thin bedded argillaceous limestones of the Rabbitkettle Formation in Richardson Trough. Upper Ordovician to Lower Devonian parts of the Bouvette also pass laterally to shales of the Road River Formation in the regions of Blackstone Trough and Royal Mountain Platform (Fig. 9).

Near the Alaska border, Bouvette strata pass laterally westward into the Jones Ridge Limestone. Southward, Bouvette strata pass to shales of the Road River Group in Selwyn Basin. Sections 7 and 4 (MTA-86-25 and MTA-86-5), in the Dawson map area (Appendix 5), are the southernmost sections of strata assigned to the Bouvette Formation in the western part of the Yukon Stable Block. A thick sequence of Road River shales is mapped in the southern part of the Dawson map area, which is approximately the same age as an unnamed map unit of lower Paleozoic carbonates in the northern part of the map area (Green, 1972). The latter unit is assigned provisionally to the Bouvette Formation. The northern limit of this Road River sequence is considered to mark the edge of Selwyn Basin in this area.

Lithology and internal markers. Surface sections provide the most complete lithological information with respect to the Bouvette Formation because of the scarcity of subsurface sections and well cores. The lithological description of the type section (Section 36; MTA-86-11) applies generally to the Bouvette throughout the central part of its regional development, which coincides approximately with the region of the Blackstone Trough (Fig. 3) where the Bouvette is overlain by Road River shale of dominantly mid-Ordovician to Silurian age. In general, the regional top of the Bouvette across the Yukon Stable Block is mid-Ordovician in age (Fig. 9), but as noted previously, at some localities, such as the Royal Mountain Platform, Bouvette carbonates are as young as Early Devonian (Pragian).

The lower part of the Bouvette Formation tends to be less resistant than the upper part and forms a rather dark band, although the lowermost beds are a more brightly coloured yellowish orange, rather than grey. The lowermost units of the Bouvette contain abundant lenses or pockets of reworked and imbricated dolomudstone lithoclasts (Fig. 26, 29). Bands of laterally linked hemispheroidal stromatolites are common. Mudcracks occur sporadically and most of these lower units are formed of argillaceous, yellow to orange, laminated dolomudstone, or dololaminite. Oolitic, and even pisolitic bands occur in the lower parts of some sections.

The middle and upper parts of the Bouvette Formation in this central area are more resistant and tend to be light grey. They are formed dominantly of intervals of thick to very thick bedded, light grey, vuggy, medium to coarsely crystalline dolostone that are intercalated with dololaminites containing abundant fenestral fabric or that are simply separated by irregular bed partings. Intensely recrystallized and vuggy dolostone immediately underlies these partings, which may indicate that they represent local intraformational erosion surfaces (Fig. 9). The topmost beds of the Bouvette Formation in some places within the region of Blackstone Trough contain abundant coral and stromatoporoid fragments, which may represent biostromes that developed near the end of Bouvette deposition (Fig. 30). Dark grey and black chert, and/or silicification, occurs sporadically throughout the formation (Fig. 9).

The bipartite subdivision of Bouvette strata in surface sections into a lower, darker, yellowish grey and less resistant part, and an upper, lighter grey and more resistant part has not been recognized in the subsurface of Eagle Plain. Future work may extend this subdivision into the subsurface. However, even in surface exposures, this subdivision is not

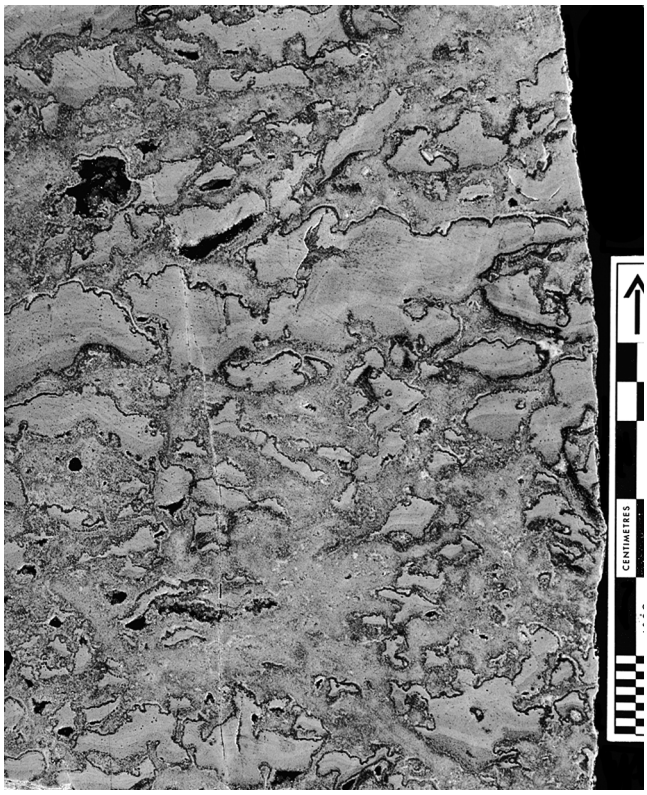


Figure 9. *Crustiform beachrock lithoclasts forming intraformational lenses of reworked beachrock within pisolite-bearing, cream-coloured dolomudstones of the lowermost unit of the Bouvette Formation in Section 4 (MT -86-). (1 0 m above section base GSC Calgary photo 416 -2 .)*

consistent enough to warrant mapping at a 1:250,000 scale, although it can be recognized at several localities.

Where local buildups or platforms of Silurian and earliest Devonian Bouvette strata are surrounded by approximately age-equivalent Road River shales, the uppermost beds of the Bouvette Formation are composed of stromatoporoid and coralline pelletal wackestones and boundstones. Section 8 (MTA-82-1; Fig. 9) within the Royal Mountain Platform is one such example. Section 15 (MTA-86-4) contains abundant stromatoporoidal boundstone near the top of the section and occurs within another unnamed platform (Fig. 15) developed on the regional Middle Ordovician upper contact of the Bouvette Formation (Fig. 31).

The Bouvette Formation in the southwest corner of the Ogilvie River map area near its western transition to the Jones Ridge Limestone is unusually thin (294 m) and is atypical lithologically. The Bouvette Formation in Section 25 (MTA-86-12) from this corner of the Ogilvie River map area is formed of very planar bedded, partly dolomitized limestones. The lower part of the Bouvette at this section is formed of moderately resistant and dolomitized pelletal

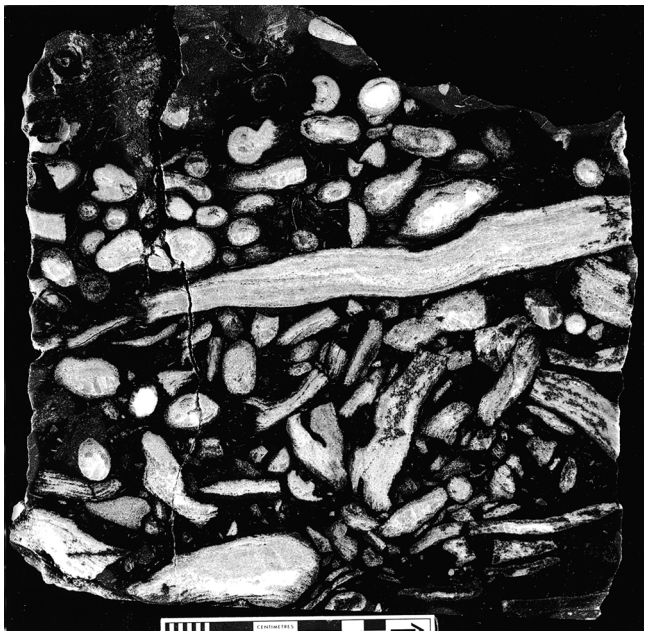


Figure 30. *Stromatoporoid rudstone packed with reworked large fragments of lamellar and rod-shaped, slightly silicified stromatoporoids. This is from the uppermost biostromal and biohermal resistant capping unit of the Bouvette Formation in unit 7 of Section 42 (MT -86-2). (1 4 m above section base GSC Calgary photo 416 -18.)*

packstones and intraclast, or lithoclast grainstones. Some, or all, of these lithoclasts are coated grains (i.e., bahamite-like grains; see Beales, 1958). These lithologies occur cyclically; dolomitized intervals of pelletal packstone alternate with lithoclast grainstone intervals. The upper part of the succession consists of uniformly thick and planar bedded, pelletal packestone and wackestone with very continuous, even bedding and smooth bed partings.

Depositional setting. The lower Bouvette was deposited predominantly on tidal flats. Following the interpretation that the Taiga and Bouvette formations together constitute a depositional unit (Fig. 12), the silty dolostones of the Taiga, and farther west, the silty lower part of the Bouvette, together represent the initial deposits of a marine transgression that covered the underlying Slats Creek and Proterozoic Gillespie Lake and Quartet groups and the undivided or unnamed Proterozoic strata that were exposed across the region of Ogilvie Arch. These orange, basal siliciclastics probably were reworked from the underlying siltstones, shales and sandstones of the Slats Creek and Proterozoic units. Sedimentary features, such as mudcracks, teepee structures, imbricated platy intraclast breccias and stromatolites indicate upper intertidal to supratidal deposition for basal Bouvette beds as well as for the Taiga Formation. The presence of oolite bands toward the top of the lower Bouvette in some sections may indicate some

Figure 31. *bundant hemispheroidal stromatoporoids in tan biolithite in the upper part (unit) of the Bouvette Formation at Section 1 (MT -86-4) (unit) in the Hart River map area (116H). These strata are only a few metres above strata dated as Early Devonian, Lochkovian to Emsian, in the Bouvette Formation of this section (see ppendix 6). (GSC Calgary photo 4298-2 .)*

subtidal deposition. One possible model for a depositional setting consistent with the sporadic occurrence of oolite beds in this part of the Bouvette is the present-day sabkhas of the Trucial Coast bordering the Persian Gulf. There, scattered oolite shoals develop adjacent to tidal deltas in the shallow subtidal to intertidal zone in front of the sabkha flats (Purser and Evans, 1973). A similar association of scattered oolite shoals and tidal flats may have formed the lower, darker part of the Bouvette.

The lighter grey, upper part of the Bouvette exhibits characteristics of shallow-marine, open-shelf deposition. The repetitive intervals of thick to very thick bedded, vuggy, medium to dark grey dolostone and light grey to white, thin to medium bedded dololaminites containing laminoid fenestral fabric, such as at the type section, are consistent with an inner shelf setting in which low energy, intertidal, shoaling-upward sequences (e.g., James, 1984) are the consequence of shifting subtidal and laterally adjacent intertidal environments that perhaps bordered shifting islands of lime mud.

A common variant on this style of repetitive depositional cycles occurs in the upper parts of the Bouvette at many localities. For example, at Section 35 (MTA-86-3), thick-bedded intervals of vuggy, light grey dolostone are separated by irregular partings of probable karst origin. Vugs are particularly abundant beneath these irregular contacts, as are pods of white, dolomite-cemented, collapse breccia. Dolomite-cemented crackle breccias are common beneath bed contacts. These karst surfaces appear to be local in extent. Individual bed partings change character laterally from irregular and karstic in appearance to smooth and non-karstic. One explanation for this style of localized karst surface development is that islands grew large enough at these localities to be subaerially exposed and to have undergone local karstification by meteoric water.

The open-marine, and locally reefal, limestones of the uppermost beds of the Bouvette may be regarded as indicative of an initial deepening across the Yukon Stable Block that immediately preceded deposition of basinal Road River shales. In some local areas, such as the Royal Mountain Platform, Bouvette deposition was able to keep pace with subsidence up to Early Devonian time.

The rather atypical Bouvette sequence at Section 25 (MTA-86-12; Fig. 9B) with its dominantly depauperate pelletal and "bahamite"-like lithoclast packstones and grainstones suggests deposition as shallow-water carbonate–sand bodies. This may indicate that this section was located in the path of strong tidal currents.

Jones Ridge Limestone

The Cambrian and Ordovician Jones Ridge Limestone (Brabb, 1967; Fig. 5) was investigated at only one locality in the southwest corner of the Ogilvie River map area (Section 21, MTA-86-28; Fig. 6, 9, 32). Here, 470 m of the light grey Jones Ridge Limestone conformably overlies dark grey and brownish grey limestone and shale of the Proterozoic Tindir Group (Brabb, 1967). This small region of exposure of the Jones Ridge Limestone lies mainly within the thrust plate of the Yukon Thrust Fault, where a corner of this thrust extends from eastern Alaska into the southwestern corner of the Ogilvie River map area in Yukon Territory (Norris, 1982a).

The top of the Jones Ridge limestone is not exposed at Section 21 (MTA-86-28) but slightly farther south, in the extreme southwest corner of the Ogilvie River map area, the McCann Hill Chert (map unit DMH; Norris, 1982a) is mapped as directly overlying the Jones Ridge Limestone (Norris, 1982a). The McCann Hill Chert is normally mapped as overlying the Ogilvie Formation in Alaska and is of Early Devonian (Emsian) to Late Devonian (Frasnian) age

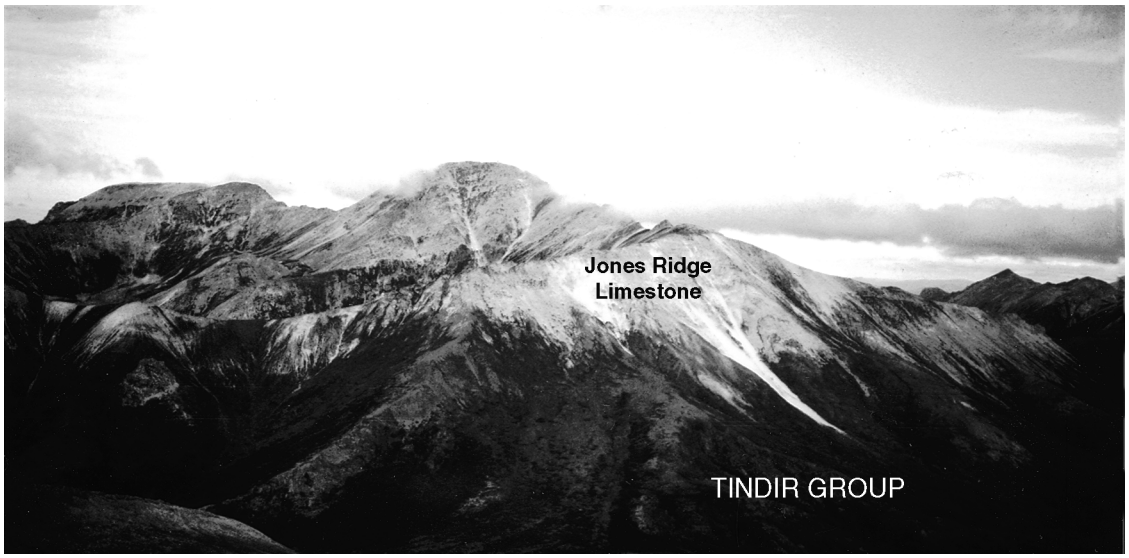


Figure 32. *Northwestward view of light grey dolostones of the Jones Ridge Limestone overlying dark limestones and shales of the Precambrian Tindir Group at Section 21 (MTA-86-28) in the Ogilvie River map area (116G and 116F, E1/2). (GSC Calgary photo 4298-3).*

(Clough and Blodgett, 1984; Norris, 1985; Fig. 5). However, strata equivalent in age to the Road River Group may be contained within the McCann Hill Chert, as mapped in this corner of the Ogilvie River map area, because Upper Ordovician, dark shale, physically continuous with Road River Shale in east-central Alaska, overlies the Jones Ridge Limestone at its type section (Brabb, 1967) only 20 km southwest of Section 21. The McCann Hill Chert at this locality must also include strata equivalent to the Ogilvie Formation because it is overlain by an undivided Carboniferous and Permian map unit (map unit CPU; Norris, 1982a).

Fossils in the Jones Ridge Limestone mainly consist of crinoids, with smaller amounts of trilobite and brachiopod fragments. The thick lower member (2940 ft.; 896 m) has yielded fossils, including archaeocyathids, ranging in age from early Late Cambrian (Dresbachian) to Early Ordovician (Brabb, 1967). The thin upper member (60 ft.; 18 m) of the Jones Ridge Limestone yielded fossils of Middle or Late Ordovician age (Brabb, 1967). A disconformity of unknown magnitude may separate these members. The Jones Ridge Limestone is correlative with most of the Bouvette Formation, except that the Jones Ridge also includes Lower and Middle Cambrian strata (Fig. 5).

The Jones Ridge Limestone at Section 21 belies its name because it is dominantly dolostone. The type section of the Jones Ridge Limestone is dominantly limestone, but the lower half of the type section at Jones Ridge, an interval about 610 m thick, is a subequal mixture of interbedded dolostone and limestone (Section 9 at Jones Ridge in Brabb, 1967). This suggests that the entire 470 m thick Jones Ridge Limestone sequence exposed at Section 21 is partly equivalent to the lower part of the Jones Ridge Limestone at the type section, which is only 20 km to the southwest.

Correlation of the lower part of the Jones Ridge Limestone at the type section with the entire Jones Ridge Limestone sequence at Section 21 is reinforced by the close similarity of both sequences with respect to sedimentary structures and lithologies. Both of these sequences contain abundant and striking silicified oolite and pisolite bands. The thick bedded oolitic and pisolitic dolomitized packstone bands in the upper part of the Jones Ridge Limestone at Section 21 display well developed low-angle crossbedding accentuated by silicification. These bands tend to occur in fining-upward cycles that display wavy to irregular contacts with underlying beds. The upper parts of these cycles tend to be oolitic and pisolitic wackestones, rather than packstones. These deposits are similar to those formed in modern carbonate-bank-margin settings, such as those bordering the Great Bahama Bank, where tidally induced, multidirectional seafloor currents have maximum velocities at bank edges and form deposits of coated grains, such as oolites and pisolites (Ball, 1967). Brabb (1967) suggested that the Jones Ridge–Squaw Mountain area immediately southwest of Section 21 was the site of shallow-water shoals that passed westward into deeper water, more open-shelf environments, represented by the Funnel Creek Limestone, Adams Argillite, and Hillard Limestone succession of west-central Alaska. It seems possible that the oolite and pisolite shoal deposits of Section 21 developed along the west-facing inboard margin of a deeper shelf to the west. The Bouvette Formation of Section 4 (MTA-86-5, Appendix 5), which is located on the edge of Selwyn Basin (Section 4 in Fig. 6),

displays similar oolitic and pisolitic deposits. These deposits may also represent a bank-margin setting, in this case bordering the deeper water environments of Selwyn Basin (Fig. 3).

The lower part of Section 21 (units 3, 4, 5 in Appendix 5; Fig. 9B) is a recessive, yellow, shaly dololaminite containing many intervals of laminated grey chert and bands of lenticular chert. Thick, resistant interbeds of dolostone chert breccia are scattered throughout. These beds of yellowish grey dolostone contain sharpstone rubble floatbreccias of platy, angular, rather tabular chert clasts. Some breccia beds contain an admixture of unique, spherical, grey chert balls about 1 to 2 cm in diameter, which do not appear to have formed in-situ as diagenetic chert nodules but rather appear to have been deposited, or redeposited, along with the angular chert fragments of these breccia beds. These brecciated, thin-bedded chert laminites indicate that silicification was essentially synsedimentary, or pre-burial.

The lower part of the Jones Ridge Limestone probably represents deep water deposition on a submarine slope, below effective wave base. Breccia beds may represent debris flow deposits that were shed downslope during deposition. Redeposited slope sediments, such as the breccia beds with platy fragments, are a common feature adjacent to depositional shelf margins (McIlreath and James, 1984). The interbedded argillaceous dololaminites probably are hemipelagic deposits. This interpretation is reinforced by the overall vertical sequence in Section 21 in which slope sediments pass upward to graded and crossbedded oolitic and pisolitic shallow-water, shelf-type sediments in a shallowing-upward sequence typical of regressive depositional margins (McIlreath and James, 1984).

A prominent, rusty brown weathering igneous dyke intrudes the entire Jones Ridge Limestone succession at Section 21 (Fig. 33). This dyke is composed dominantly of plagioclase with minor mafic minerals, chiefly biotite and horneblende, and consequently may be classified as a diorite porphyry. There is little direct evidence of the age of emplacement of this dyke, save that it is post-Ordovician (i.e., post Jones Ridge Limestone).

Road River Group (Formation)

Definition and age. The definition of the Road River Formation or Group has had a controversial history. The Road River Formation was defined originally by Jackson and Lenz (1962) with its type section at Tetlit Creek, a tributary of Road River on the east flank of southern Richardson Mountains. Here, more than 910 m of graptolitic shale, argillaceous limestone and minor chert, dolostone,

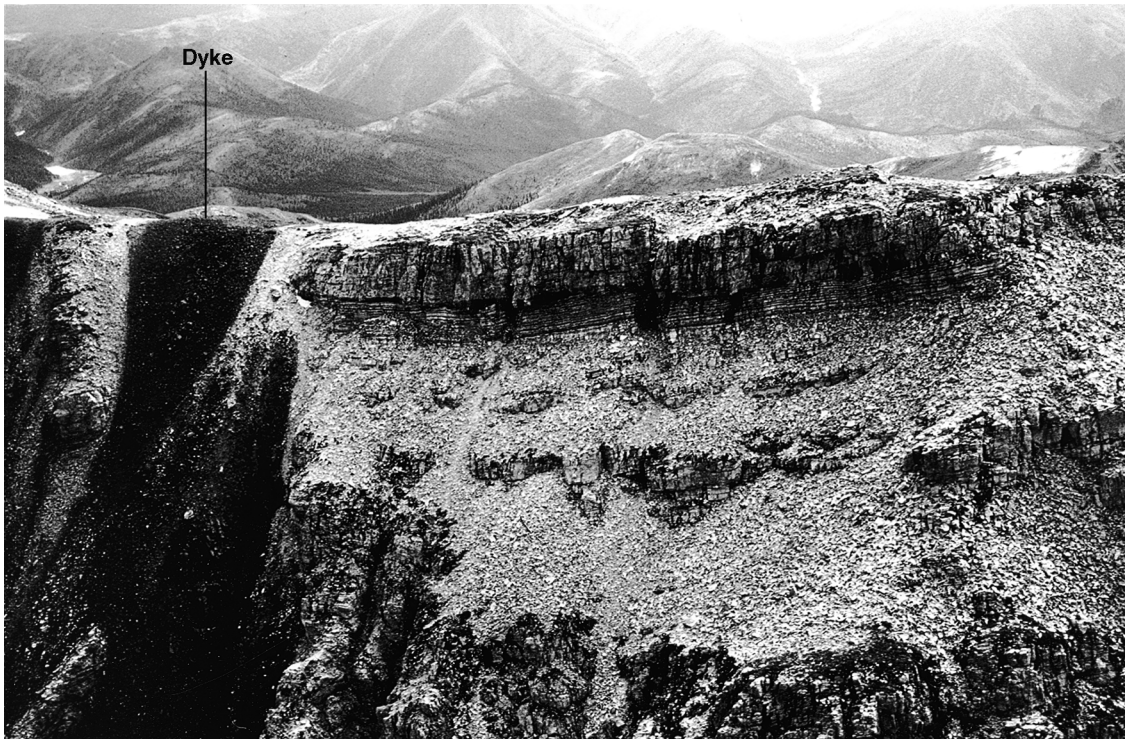


Figure 33. *n orangish-brown weathering igneous dyke about 0 m wide intruding light grey, cherty dolostones of the Jones Ridge Limestone at Section 21 (MT -86-28) in the Ogilvie River map area (116G and 116F, E1/2). This view shows the top of the section. (GSC Calgary photo 4298-2.)*

siltstone and sandstone are well exposed. The Road River Formation is abruptly overlain with an abrupt contact by siliceous black shale of the Canol Formation across the entire Richardson Anticlinorium, but the section base is faulted and therefore the Road River, as originally defined, is incomplete.

Norford (1964), following the suggestion of Jackson and Lenz (1962), divided the Road River in the type area into a lower limestone and argillaceous limestone unit and an upper recessive unit composed of shale, argillaceous limestone, shaly argillite, and chert. In the type area, the lower unit, or member, includes Upper Cambrian to Lower Ordovician strata (Norford, 1964) and the upper member was found to include faunal zones ranging from Ordovician to Lower Devonian (Jackson and Lenz, 1962; Lenz, 1966, 1972).

In the southern part of Selwyn Basin, Gabrielse et al. (1973) divided a similar sequence of shaly strata, which is broadly homotaxial with the Road River as originally defined in its type area, into two units. The lower unit consists of more than 1200 m of rhythmically bedded, argillaceous and silty limestone and was assigned to the Rabbitkettle Formation. The upper and more recessive unit of black shale, cherty and silty dolostone and argillaceous limestone, which is up to 671 m thick in south-central Selwyn Basin, was assigned to the Road River Formation. Recently, Gordey and Anderson (1993) have followed this practice of restricting the Road River to strata above the Rabbitkettle Formation in east-central Selwyn Basin.

Cecile (1982) pointed out that the Rabbitkettle Formation of Gabrielse et al. (1973) corresponds to the lower member of the Road River Formation, as defined by Norford (1964) in its type area. In the Misty Creek Embayment region of Selwyn Basin, Cecile (1982) also recognized the Rabbitkettle Formation and subdivided basinal strata overlying the Rabbitkettle into two new formations, the Duo Lake and Cloudy formations. Cecile (1982) also noted that strata equivalent to the Hess River to Cloudy formational sequence were previously mapped together as Road River Formation by Blusson (1974) and were described as Road River Formation by Aitken et al. (1973). Cecile (1982) suggested that the entire Hess River to Cloudy formational sequence in Misty Creek Embayment could be reasonably assigned to a Road River Group, but he deferred this assignment because the type section of the Road River Formation itself is incomplete and also because of the different usage followed by Gabrielse et al. (1973) in placing the base of the Road River Formation above the Rabbitkettle Formation, instead of beneath it.

Following Cecile's (1982) work, Fritz (1985) raised the Road River Formation to formal group status. In the type area of the original Road River Formation, Fritz assigned all strata above the Slats Creek Formation up to the base of the Canol to the Road River Group. This includes all strata mapped as Road River Formation (map units ЄDR0 to ЄDR4 inclusive) across the Richardson Anticlinorium on the Operation Porcupine geological maps (Norris, 1981b, c; see also Fig. 15). Like Cecile (1982), this included some shaly strata of basinal aspect below the Rabbitkettle equivalent in his Road River Group of Richardson Anticlinorium. Fritz (1985) pointed out that the restriction of the Road River Formation to strata above the Rabbitkettle as adopted by Gabrielse et al. (1973) was not in accord with the usage favoured by the North American Stratigraphic Code, which states that "when a unit is divided into two or more of the same rank as the original, the original name should not be retained for any of the divisions" (Oriel, 1973, Article 19g).

More recently, Cecile et al. (1982) and Cecile (pers. comm.) subdivided Road River strata, as mapped by Norris (1981b, c) within the Richardson Anticlinorium, into four units including three informal, but named, units. The lowermost unit is the Rabbitkettle Formation, which has, of course, pre-existing formal status in Selwyn Basin. The other three in ascending order, are the Loucheux, Dempster and Vittrekwa (Cecile, pers. comm.). These are not accorded formational status here, but instead remain informal subdivisions of the Road River Group. The subdivisions of Cecile et al. (1982) correspond in general to the Road River map unit subdivisions of Norris (1981b, c) such that the Rabbitkettle Formation (map unit ЄOr of Cecile et al., 1982) and the Loucheux (map unit OSl of Cecile et al., 1982) are equivalent to the ЄDR1 map unit of Norris (1981b, c); the Dempster (map unit Sd of Cecile et al., 1982) is equivalent to the ЄDR3 map unit unit of Norris (1981b, c) and the Vittrekwa (map unit SDv of Cecile et al., 1982) corresponds to the ЄDR4 map unit unit of Norris (1981b, c). These units are also recognizable in the subsurface, in the Gulf Mobil Caribou YT N-25 well on the east side of the Richardson Anticlinorium (Fig. 19), although it is difficult to establish precise correlations from surface to subsurface because of the subtle differences in weathering colour and lithological composition used to differentiate these units in outcrop. This is particularly true for the Dempster and Vittrekwa units, the uppermost subdivisions of the Road River in Richardson Trough (Cecile et al., 1982). Unlike Fritz (1985), Cecile et al. (1982) did not include the lowermost subdivision of the Road River of Norris (1981b; 1981c; map unit ЄDR0) in their Road River succession.

The analysis of Fritz (1985), in conjunction with the work of Cecile (1982) and Cecile et al. (1982) concerning the Road River in the Richardson Trough and northern Selwyn Basin, and the mapping of Norris (1981b, c) all indicate that the elevation of the Road River Formation to group status in these areas is justified in spite of the problems with regard to its internal lithostratigraphy. Consequently, the Road River is here accorded formal group status within Richardson

Trough, and includes one formal formation, the Rabbitkettle Formation, and the three informal subdivisions of Cecile et al. (1982), the Loucheux, the Dempster and the Vittrekwa, in addition to the Csh map unit mapped by them above the Slats Creek Formation and beneath the Rabbitkettle Formation across the Richardson Anticlinorium. Recently, Norford (1997) noted that common usage has included all upper Lower Cambrian to Devonian basinal facies within the Road River Group. This usage would be consistent with the inclusion of the Csh map unit of Cecile et al. (1982), or the ЄDR0 map unit of Norris (1981b, c), within the Road River Group.

The issue of what constitutes the Road River in south-central Selwyn Basin is left to later studies dealing with those areas. Fritz (1985) has suggested that the definition of the Road River is flexible enough to permit exclusion of Rabbitkettle strata in south-central Selwyn Basin in accordance with the definition of the Road River adopted by workers in that region. However, this merely reinforces the contradictions in the present usage of the Road River throughout the northern Cordillera. If this contradiction is not resolved in the future, the Road River may become an obsolete term, particularly for the Selwyn Basin region (M.P. Cecile, pers. comm.).

At present, Road River strata constitute a meaningful group of formations within Richardson Anticlinorium and Misty Creek Embayment. The westward extension of Road River shale and argillaceous limestones onto the Yukon Stable Block above Bouvette carbonates (Fig. 9, 19) is relatively thin and not readily subdivided into mappable units. Road River strata in this region, centred on the Blackstone Trough (Fig. 3), are regarded as simply the Road River Formation in accordance with the Code, which states that "The wedge out of a component formation or formations may justify the reduction of a group to formation rank, retaining the same name" (Oriel, 1983, Article 28c, see also Article 19c).

The Road River Group has a maximum age range of Late Cambrian to Middle Devonian within the thick Road River sequence at its incomplete type section in the Richardson Anticlinorium (Norford, 1997; Fig. 5). Nine kilometres south of the type section, Dresbachian trilobites of the lower Upper Cambrian occur low in the Road River Group (Fritz, 1985). In a few places, the basal shales of the Road River rest directly on the Illtyd Formation. Fossils indicate that these lowermost Road River strata lie within the upper part of the *Bonnia–Olenellus* Zone of the upper Lower Cambrian (Fritz, 1985). Across the Yukon Stable Block, Road River strata have a more restricted stratigraphic range between the underlying Bouvette Formation and the overlying Michelle and Ogilvie formations (Fig. 5). Faunal data collected for this study indicate that Road River strata in this region are restricted in age, ranging from early Middle Ordovician to Early Devonian, with diachronous upper and lower contacts (Fig. 9).

Distribution, thickness and contact relations. The Road River Group occupies Richardson Trough and extends across most of the Yukon Stable Block (Fig. 34, 35) but is not present across the Mackenzie–Peel Shelf or in the region of the Dave Lord High in the northwest part of the Yukon Stable Block (Fig. 35). The Road River of the study area extends southward and is continous with the Road River of Selwyn Basin and the Misty Creek Embayment.

The Road River Group in the study area has an average thickness of about 500 m, but, over a large area of the Yukon Stable Block, it is less than that (Fig. 34). Main depocentres are Richardson Trough, where Road River strata have a maximum thickness of nearly 3000 m (Norford, 1964; Cecile et al. 1982) and Blackstone Trough, with more than 500 m of Road River sediments. There is also a Road River depocentre around the Blackstone D-77 well, near the centre of the Yukon Stable Block (Fig. 22, 34) where nearly 500 m of Road River strata accumulated.

The extreme thickness of the Road River in Richardson Trough is due, in large part, to the very thick Rabbitkettle sequence of shaly lime mudstones and dolostones (up to 2000 m thick at Section 58; Fig. 6, 19). Section 58 is a composite section that combines Sections 3 and 4 of Cecile et al. (1982; Appendix 7).

In other areas, such as Blackstone Trough, the Rabbitkettle Formation is absent and the Road River Group is represented entirely by more shaly strata characteristic of the upper part of the Road River Group within Richardson Trough. Basinal Rabbitkettle strata of Richardson Trough pass laterally into coeval shallow-water carbonates of the Mackenzie–Peel Shelf to the east (Franklin Mountain Formation) and of the Yukon Stable Block to the west (Bouvette Formation; Fig. 19).

The upper part of the Road River Group in Richardson Trough, including the Loucheux, the Dempster and the Vittrekwa units of Cecile et al. (1982), is about 750 to 850 m (e.g., 820 m in Section 4 and 850 m in Section 2 of Cecile et al., 1982; see Appendix 7 - Columnar Sections (L)). This is only slightly thicker than correlative Road River shales across the Yukon Stable Block. At Section 57 (MTA-82-12 in Appendix 5; Fig. 6) along the headwaters of Trail River on the east side of Richardson Anticlinorium, 726 m of upper Road River strata were measured. The slightly greater thickness of this upper Road River sequence in Richardson Trough versus the average thickness of the Road River Formation across the Yukon Stable Block may, in part, be due to the probable correlation of the basal part of the upper Road River in Richardson Trough with upper Bouvette strata (Fig. 19).

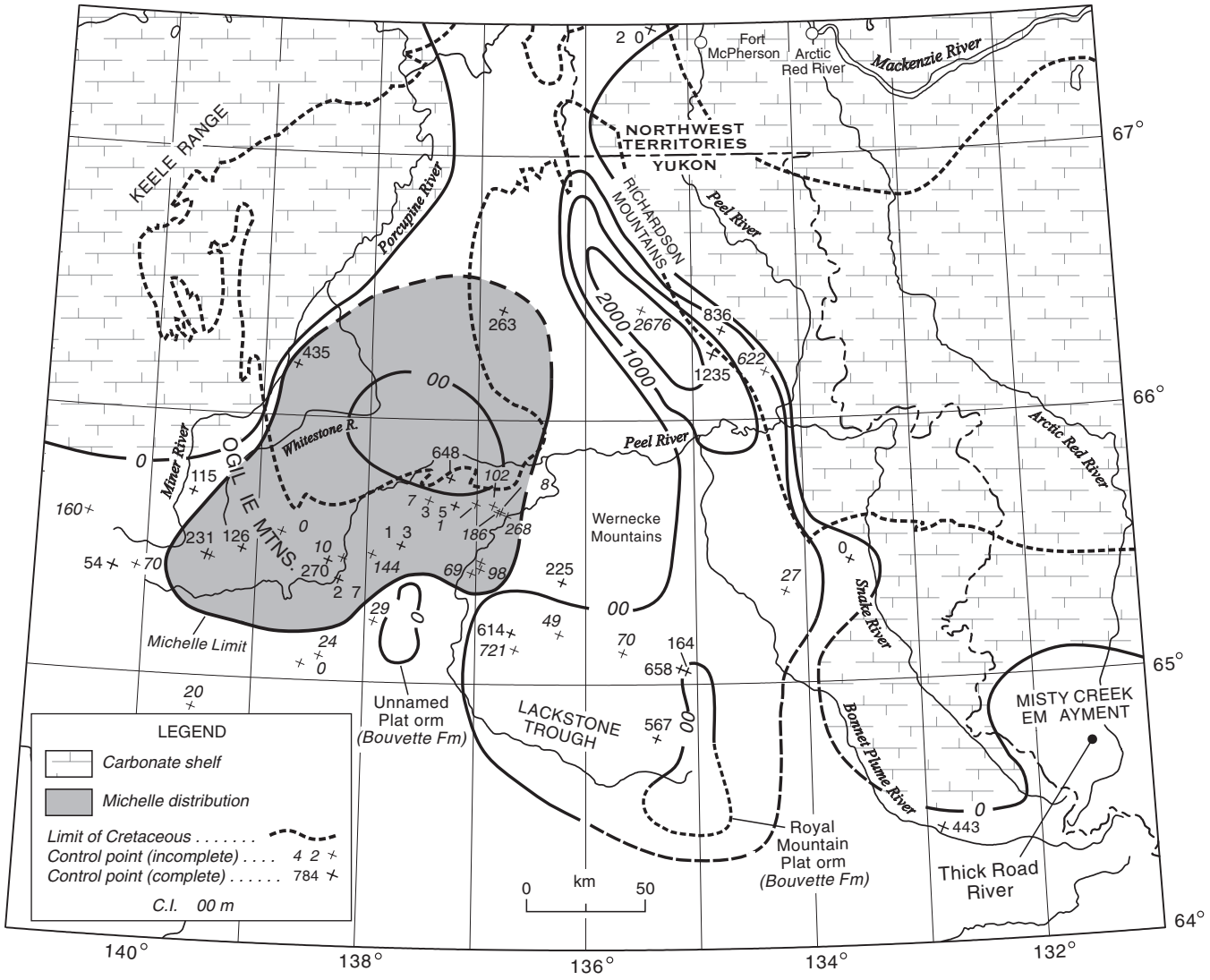


Figure 34. *Distribution and thickness of the combined Road River Group and Michelle Formation. The Blackstone Trough, a feature shown along the southern boundary of the Yukon Stable Block on many previous paleogeographic maps of this interval, is irregular in shape and appears to be a westward extension of the south end of Richardson Trough onto the southeastern part of the Yukon Stable Block.*

Isolated areas with very thin, or no Road River strata, occur within or near Blackstone Trough. These areas coincide with the large carbonate buildups, or platforms, such as Royal Mountain Platform, that rise above the regional top surface of the Bouvette Formation (Fig. 9, 34). Road River shales surrounding these Bouvette buildups, like the buildup carbonates themselves, are Silurian to Early Devonian (Pragian and Zlichovian) in age (Fig. 9; Lenz, 1968).

In the Richardson Trough, the Road River Group overlies sandstones of the Slats Creek Formation with a disconformable to conformable contact (Fig. 19). This contact was not examined in this study, but Fritz (1997) observed an interbedded gradational contact between Slats Creek sandstones and basal shales of the Road River Group a few kilometres south of the Road River type section. Across the Yukon Stable Block, shales of undifferentiated Road River Formation rest conformably on shelf carbonates of the Bouvette Formation. The lower part of the Road River on the Yukon Stable Block also passes laterally into uppermost Bouvette strata, particularly in the region of the Blackstone Trough (Fig. 9, 19, 22). Eastward from Richardson Trough, the Road River passes abruptly into the entire lower Paleozoic shelf carbonate sequence, from the Franklin Mountain Formation up to, and including, the Hume Formation of the Mackenzie–Peel Shelf across a narrow transition zone (Fig. 19).

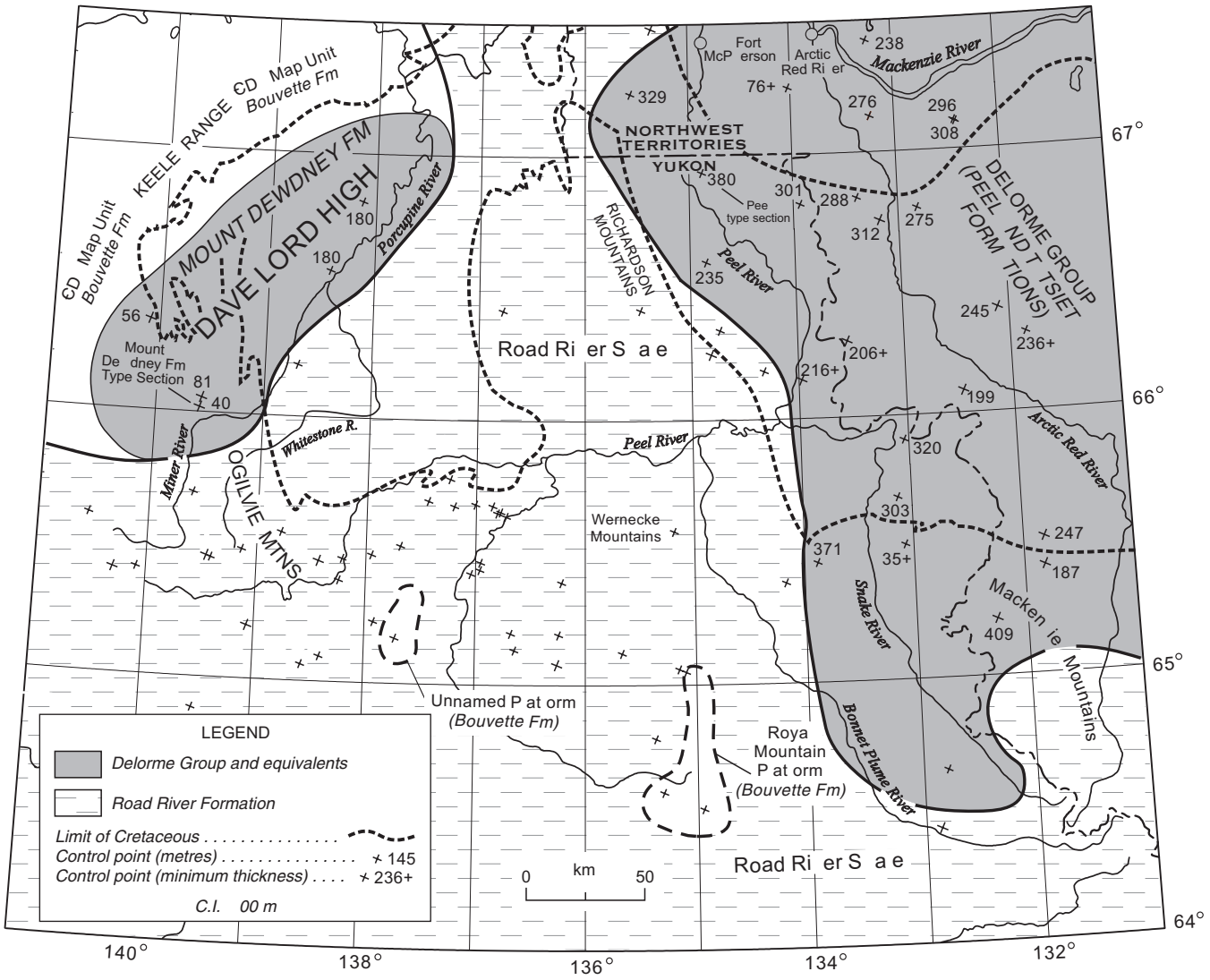


Figure 35. *Distribution and thickness of the Delorme Group and the age-equivalent Mount Dewdney Formation across the Dave Lord High on the Yukon Stable Block. Note the isolated carbonate platforms within shales of the Road River Group. reas covered by the Delorme Group and Mount Dewdney Formation were exposed subaerially in Late Silurian time.*

Overlying the Road River Group in Richardson Trough are the siliceous black shales and cherts of the Canol Formation. The upper contact of the Road River with the Canol Formation in this area has been regarded as both unconformable (e.g., Perry et al., 1974; Norris, 1985) and conformable (e.g., Williams, 1983; Pugh, 1983), or both (Norris, 1985). In general, the regional character of the basal contact of the Canol Formation with underlying units, including the Road River, has been a contentious issue (Fig. 4, 5, see also subsection entitled *Definition and age* under *Ogilvie Formation*).

Evidence for an unconformable contact is derived primarily by inference from faunal determinations. Along the Mackenzie Mountain front, lowermost Canol beds contain conodonts of the lowermost *asymmetricus* Zone indicative of the uppermost Middle Devonian (i.e., latest Givetian Stage; Uyeno, 1979). *Inversus* Zone conodonts collected from the upper beds of the Road River Formation beneath the Canol in the Richardson Trough area indicate an Early Devonian age for these beds (Perry et al., 1974; Norris, 1985). Norris (1985) pointed out that this suggests a considerable hiatus between the Canol and Road River formations. He argued that the westward disappearance of units, such as the Hare Indian Formation, beneath the Canol is evidence in favour of uplift and truncation at a sub-Canol unconformity. Recently, however, Uyeno (1991) has assigned the Allochthonous Beds immediately beneath the Canol Formation in its type area to the *norrisi* Zone of latest Givetian age indicating that, at least in the type area of the

Canol Formation around Norman Wells, deposition was probably continous between Ramparts and Canol formations (Fig. 10 in Uyeno, 1991).

Williams (1983) pointed out that the westward disappearance of units beneath the Canol follows a pattern of sedimentation typical of many areas of northwestern and western Canada during the Devonian. He suggested that the Hare Indian Formation represents a mudbank that prograded westward in late Middle Devonian time. The westward thinning and disappearance of the Hare Indian, and the overlying Ramparts Formation, merely indicate that these units had a westward limit to their progradation and were not eroded beneath the Canol. The occurrence of a conodont fauna aligned with the *costatus* Zone of the Middle Devonian from uppermost Road River strata in the Richardson Mountains at Road River (Uyeno and Mason, 1975) has narrowed the inferred time gap between the end of Road River deposition and the beginning of Canol deposition in Richardson Trough. This supports the suggestion of Williams (1983) that the basal beds of the Canol Formation represent condensed deposition consistent with a distal fondothem (Rich, 1951) and a deeper water environment basinward from a prograding mudbank, or clinothem. This interpretation would be consistent with earliest Middle Devonian strata of the uppermost Road River being overlain by a thin condensed section of basal Canol that is late Middle Devonian in age. The occurrence of a horizon of 1 to 2 cm diameter barite nodules less than 0.5 m above the base of the Canol at Section 57 (unit 8 in MTA-82-12, Appendix 5) is evidence in support of the interpretation of very condensed deposition for the lowermost siliceous, rusty weathering black shale beds of this formation. Slow deposition under anoxic basinal conditions would promote the concentration of barium in solution, similar to modern-day settings, such as the Black Sea, where the bottom waters are greatly enriched in dissolved barium, causing the diagenetic formation of barite nodules in the sediments (Deuser, 1974).

The upper contact of the Road River with the Canol observed in this study is sharp, but there is no physical evidence for an unconformity at the top of the Road River in outcrop sections (e.g., Sections 57 and 9 - MTA-82-12 and MTA-82-13; Fig. 36). As noted by Norris (1985), the uppermost Road River is a soft, very recessive, black weathering shale. A few solitary beds of resedimented, weakly graded lime packstones that may have been submarine sediment gravity flows (turbidites?) occur near the top of the Road River in Section 57, perhaps indicating the onset of marine transgression and greater water depths that led to Canol deposition (Williams, 1983).

Across the west-central part of the Yukon Stable Block the Road River is conformably overlain by the argillaceous and fossiliferous lime mudstones of the Michelle Formation

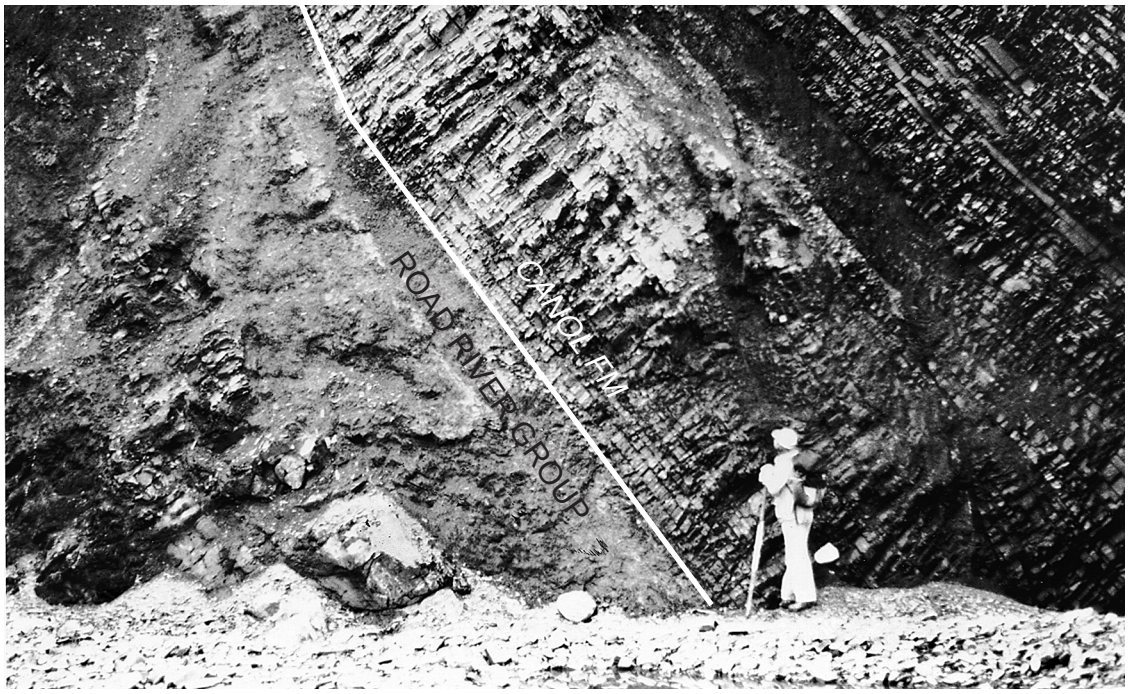


Figure 36. *Upper contact of soft-weathering black shales of the Road River Group, or of the Vittrekwa subdivision of the Road River Group of Cecile et al. (1982), with resistant siliceous shale and chert of the overlying Canol Formation at Section 57 (MTA-82-12) along Trail Creek in the Trail River map area (106L). (GSC Calgary photo 4298-9.)*

(Fig. 9, 22, 34) which itself is transitional upward to shallow-water limestones of the Ogilvie Formation (Fig. 9). In western Blackstone Trough, the Road River is overlain by Ogilvie limestone, but silicified shale of the Canol directly overlies Road River in the region of the Royal Mountain Platform in eastern Blackstone Trough (Fig. 9A).

Lithology, internal markers and geochemistry. Up to 2000 m of argillaceous limestones of the Rabbitkettle Formation form the thick lower part of the Road River Group in Richardson Trough. Only uppermost strata of the Rabbitkettle were examined in outcrop in this study. Cecile et al. (1982) described it as a yellow to grey weathering, dark grey to black, rhythmically bedded argillaceous lime mudstone. Rhythmic bedding comprises alternating intervals of recessive, very thin shaly beds and more resistant, medium bedded, lime mudstone beds. Chert nodules and lenses and pyrite are scattered sporadically throughout. Graptolites are present throughout, though not abundantly. Uppermost Rabbitkettle strata, which were examined at Trail River (Section 57 (MTA-82-12; Appendix 5), display all of these features as well as some lenses of lime grainstone that occur in concave-upward scours found along the bases of some thicker beds.

Loucheux strata above the Rabbitkettle Formation in Richardson Trough (Fig. 19) are described by Cecile et al. (1982) as recessive, black, partly silicified, graptolitic shales with intervals of more resistant orange to yellow weathering, grey limestones and some interbeds of resedimented carbonate breccia. Strata assigned to the Loucheux, which were examined in this study at Trail River (Section 57, units 2 and 3), were more resistant than those described by Cecile et al. (1982) and are dominantly rhythmically bedded yellowish grey shale and grey lime mudstones with smooth bed partings. Resedimented slope breccia beds, consisting of rubble floatbreccia and packbreccia up to 1 m thick are common in the lower part of the Loucheux at Trail River. Fragments in these breccias range in shape from undeformed parts of thin lime mudstone beds to pieces rounded and folded by plastic, synsedimentary deformation. Resistant intervals in the lower part of the Loucheux at Trail River contain closely spaced sets of breccia beds. Disharmonic soft-sediment slump folds are common. In a few places in the Loucheux unit, thin lime mudstone beds in interbedded shale–limestone couplets, exhibit closely spaced boudins separated, or nearly separated, by grey shale. Cecile et al. (1982) assigned about 450 m of strata to the Loucheux in the north and central parts of the Richardson Anticlinorium. This is reasonably consistent with the 525 m assigned to the Loucheux at the Trail River section of this study, in the southern part of Richardson Anticlinorium, and the 577 m assigned here to the Loucheux in the Gulf Mobil Caribou YT N-25 well. The more radioactive intervals of Loucheux shale in this well tend to be strongly silicified, similar to the darker silicified Loucheux shales reported by Cecile et al. (1982) from the northern part of the Richardson Anticlinorium.

Dempster strata, immediately overlying the Loucheux interval in the Richardson Anticlinorium, range from about 100 to 150 m thick in sections measured by Cecile et al. (1982). An incomplete Dempster section of 31 m was measured at Trail River (Section 57). A much thicker sequence (524 m) has been assigned, tentatively, to the Dempster in the Gulf Mobil Caribou YT N-25 well (Fig. 19). It is possible that the lower part of the anomalously thick Dempster in this well could be assigned instead to the Loucheux. The base of the Dempster in this well has been chosen at an abrupt downhole decrease in the gamma-ray log radioactivity and in the sonic-log acoustic transit time.

Cecile et al. (1982) described the Dempster as a buff to orange weathering, greenish grey argillite and argillaceous dolostone containing abundant fossil trails on bed partings. In the Trail River section of this study (Section 57; units 4 and 5) Dempster strata are composed of light orange and yellow weathering, greenish grey calcareous shale and argillaceous lime mudstone punctuated by two intervals of orange weathering, dark grey, silty dolostone and a few orange, granule conglomerate or breccia beds composed of reworked orange dolostone, chert, shale and crinoid fragments. Some of these granule conglomerates are distinctly graded (Fig. 37). No fragments larger than granule size were observed in these resedimented breccia and/or conglomerate beds. Bioturbation is pervasive, and abundant individual burrows are preserved in the uppermost, more

Figure 37. *Grainstone debris-flow deposit of granule-si ed chert and shale pebbles with scattered crinoids from the upper part of the Road River Group in Section 7 (MT -82-12). (6 7 m above section base GSC Calgary photo 416 -27.)*

shaly beds. Small (1 to 2 cm) scattered barite nodules occur near the base of the Dempster exposed at Trail River.

The Vittrekwa subdivision of Cecile et al. (1982), which overlies the Dempster strata, ranges from about 100 m to 300 m thick in the northern part of the Richardson Anticlinorium. At Trail River, Vittrekwa strata are 72 m thick. In the subsurface, 197 m of strata in the Gulf Mobil Caribou YT N-25 well have been assigned to the Vittrekwa (Fig. 19). Probably both the Vittrekwa and Dempster are present in the Shell Peel River YT I-21 well, but, because a shaly Mount Kindle sequence is present in this well in place of Loucheux shales, Road River strata are left undivided (Appendix 3). This well is directly east of the Caribou N-25 well and is closer to the Mackenzie–Peel Shelf edge.

In the northern and central parts of the Richardson Anticlinorium, the Vittrekwa contains rusty, black, variably siliceous shales punctuated with some intervals of yellow weathering, grey lime mudstones (Cecile et al., 1982). This is similar to the Vittrekwa examined at Trail River (Section 57; units 6 and 7). In the Caribou N-25 well, the base of the Vittrekwa is chosen at an abrupt downward increase in both the gamma-ray and sonic logs (Fig. 19). Vittrekwa lithologies in the Caribou N-25 well include brown calcareous shale and shaly lime mudstone that contain ostracodes and tentaculitids.

Tentative correlations between subdivisions of the Road River Group and the shelf carbonates of the Mackenzie–Peel Shelf and Yukon Stable Block are shown in Figure 19. Loucheux strata are the approximate time equivalent of the Mount Kindle Formation and the upper part of the Bouvette Formation. Dempster deposits are regarded as having been shed basinward during the erosional event leading to the development of the sub-Devonian unconformity beneath the sandy and silty Delorme Group on the Mackenzie–Peel Shelf (e.g., Morrow, 1991). Vittrekwa deposits are regarded as being equivalent, in part or completely, to the Peel to Hume succession on Mackenzie–Peel Shelf and to the Michelle to Ogilvie interval of the Yukon Stable Block.

Rabbitkettle, and particularly Loucheux strata in the Richardson Anticlinorium are closely similar in lithology, sedimentary features and faunas to their counterparts in the basinal Misty Creek Embayment sequence, the Rabbikettle and Duo Lake formations (Cecile, 1982). The basinal Dempster and Vittrekwa subdivisions in the Richardson Anticlinorium do not have direct counterparts in Misty Creek Embayment because, during Early Devonian time, this area was blanketed by the Delorme to Hume sequence of the Mackenzie–Peel Shelf.

The thin, undivided Road River strata across most of the Yukon Stable Block are very recessive and generally form distinct, but narrow, valley floors separating resistant Bouvette strata from ridges formed of Ogilvie Formation. Road River strata in Sections 36 and 25 (MTA-86-11 and MTA-86-12) are typical of this type of thin Road River succession (Fig. 9). Dark brownish grey calcareous and dolomitic, slightly graptolitic shale occurs in poor and heavily vegetated exposures, along with a few interbeds of dark grey lime mudstone and bands of ribbon chert. Most of these thinner Road River sequences on the Yukon Stable Block pass gradationally upward to the argillaceous limestones of the Michelle Formation (Fig. 9, 22). The age range of this thin Road River sequence probably extends from uppermost Middle Ordovician, or lowermost Late Ordovician, to Early Devonian (possibly Pragian).

The thicker Road River sequence in the Blackstone Trough region, typified by Sections 14 and 17 (MTA-82-16 and MTA-85-2; Fig. 9), forms broader valley floors. The thick Road River strata of this area are overlain directly by limestones of the Ogilvie Formation with a conformable, fairly abrupt contact, rather than passing upward through the argillaceous limestones of the Michelle Formation in the western (e.g., Section 14 in Fig. 9) and eastern parts of Blackstone Trough (Fig. 38). Ogilvie limestones are absent in the central part of Blackstone Trough and in this area black, rusty weathering siliceous shales of the Canol Formation directly overlie Road River strata with an abrupt, but conformable, contact.

Road River strata across the western and central parts of Blackstone Trough comprise intervals of dark grey, argillaceous lime mudstone and shale alternating with intervals of medium to light brownish grey, dolomitic and calcareous siltstone. A prominent, thin marker limestone bed occurs about two thirds of the distance above the base of the Road River succession of this region. This resistant limestone “rib” contains faunas that belong to the Upper Ordovician *Bighornia–Thaerodonta* Fauna (i.e., the Arctic Ordovician Fauna). Faunas recovered from the top surface of this limestone marker unit in Section 14 indicate a probable Middle to Late Silurian age (GSC loc. C-124609; Section 14 (MTA-82-16) in Appendix 6). Road River strata above this marker are very recessive, dark brownish grey shales, Late Silurian to earliest Devonian in age. Well preserved and abundant Middle Ordovician graptolite faunas occur throughout the Road River beneath this marker bed. The limestone marker horizon itself may correlate approximately with the uppermost few metres of the Bouvette Formation in areas within the Yukon Stable Block adjacent to the Blackstone Trough (Fig. 9).

The region around the Royal Mountain Platform is transitional between the Blackstone Trough to the west and Richardson Trough to the north. Road River strata in sections near Royal Mountain Platform probably range in age from mid-Silurian to the Middle Devonian *costatus* Zone (Norris, 1985) and overlie Middle to Upper Ordovician

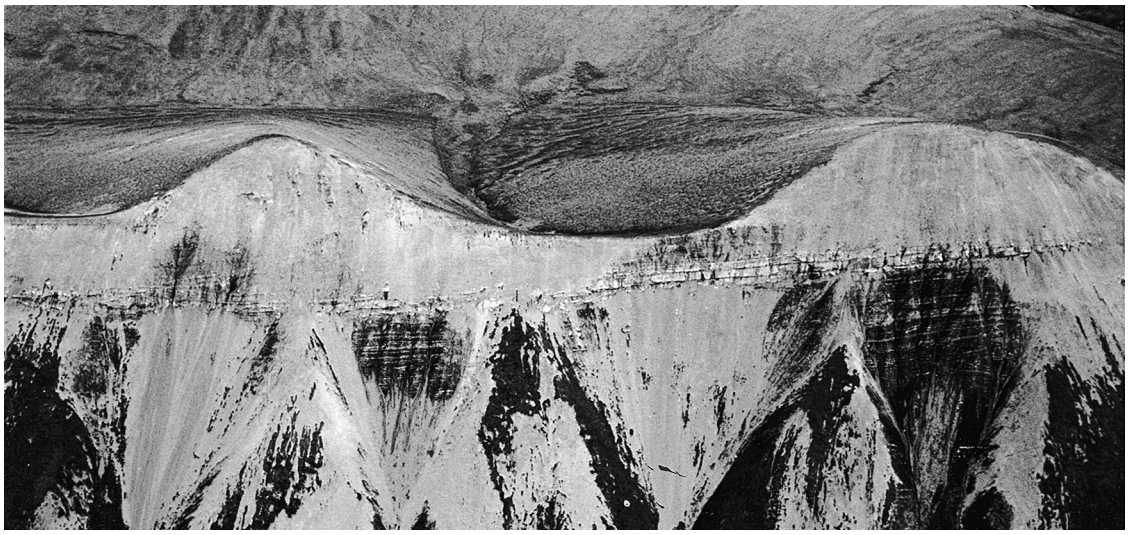


Figure 38. *View northward of light to medium grey crinoidal limestones of the Ogilvie Formation overlying dark calcareous shales of the Road River Formation at Section 22 (MT -82-) in the Wind River map area (106E). Lighter coloured beds in the Road River are skeletal wackestone sediment gravity flows, or debris flows with coarser limestone fragments (GSC Calgary photo 4298-11).*

Bouvette carbonates (Fig. 9A). In sections close to the Royal Mountain Platform, Road River sequences contain abundant crinoidal and skeletal packstone and wackestone beds displaying scoured bed contacts (Fig. 39). Similar debris-flow-like deposits were observed in Road River sections close to the basinward edge of the Mackenzie–Peel Shelf (Fig. 40).

The mineralogical compositions of 33 Road River shale samples from 16 sections are shown in Table 3. Quartz and calcite are dominant, with quartz predominating. Several samples are composed of nearly 100 per cent quartz. It is not known what portion of the quartz fraction is present as detrital quartz versus intergranular and/or replacement quartz cement. Thin section examination of a few Road River samples indicates that about two thirds of the quartz component is present as detrital material. Calcite commonly forms less than 50 per cent, and dolomite less than 10 per cent of Road River samples. In general, the carbonate fraction is present as subequal amounts of cement and detrital material. Micas and potassium feldspars are nearly absent. Plagioclase is present in small amounts of up to 6 per cent in samples from Section 57 along Trail River in the Richardson Anticlinorium, but is otherwise absent. Innis (1980) reported minute feldspar fragments and possible volcanic glass fragments in calcareous micritic shales of the Road River in the southern Richardson Mountains. Barite and pyrite are common trace components.

Figure 39. *Crinoidal wackestone and packstone debris flows in the upper part of the Road River Formation of Section 9 (MT -82-1 , unit 8), along the west side of Royal Mountain in the Wind River map area (106E). (GSC Calgary photo 4298-10.)*

The major element oxide percentages of these samples, with SiO_2 and CaO being the dominant major elements, are consistent with their mineralogy (Table 4). Al_2O_3 is also present up to several percent, perhaps indicating that feldpars and/or micas are present in trace amounts not discernible on X-ray diffractograms. Metallic elements (Table 5), such as Zn, Ni and Mn are present in amounts ranging from tens to hundreds of parts per million. Cr, Nb, Zr, Y and Rb are generally present in concentrations of tens of parts per million. Ba and Sr are present in concentrations ranging up to several thousands of parts per million. U is present at concentrations of a few parts per million in a few samples only, and Th, and surprisingly Pb, are absent. The minor and major element compositions of these samples are broadly similar to those of shale samples from the Road River sequence in Misty Creek Embayment (Cecile, 1982).

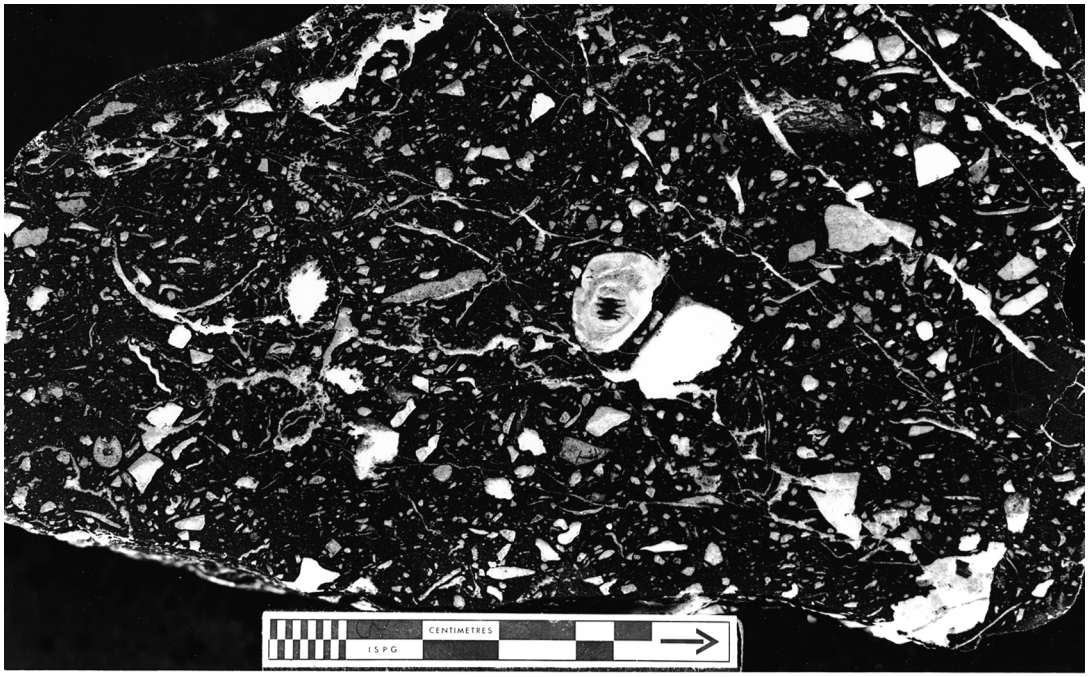


Figure 40. *Rudaceous wackestone debris-flow deposit containing abundant crinoid and other skeletal fragments from the middle of the Road River Formation of Section 1 (MT -82-7), near the lower Paleo oic shelf edge in the Nadaleen River map area (106C) (129 . m above section base GSC Calgary photo 416 -19).*

Zn, Sr and Ba are present in concentrations much higher in the Road River of the Richardson Mountains than those typical for an average shale (Turekian and Wedepohl, 1961).

Interestingly, the Road River shale samples from Section 57 (MTA-82-12), which are the only samples from the Richardson Anticlinorium itself, have anomalously high concentrations of Ti, Rb, Zr and Na. This, along with the plagioclase and possible volcanic glass present in these samples, implies a distinctly greater volcanic contribution than for the Road River shales farther west across the Yukon Stable Block. In this respect, Richardson Trough shales are similar to shales of the Misty Creek Embayment, which are also titaniferous (Cecile, 1982).

Depositional setting. The Road River was deposited in a variety of basin- and basin-margin-slope environments. In Richardson Trough the basal sandy shale deposits of the Road River Group beneath the Rabbitkettle were not examined but Cecile et al. (1982) described them as turbiditic. These shaly deposits represent the initial deepening of the Richardson Trough after deposition of the underlying, relatively shallow-water, partly nonmarine or continental, sandstones and siltstones of the Slats Creek Formation (Fritz, 1997).

The very uniform and laterally continuous rhythmic or cyclic bedding of thin to medium lime mudstone beds separated by thin shaly or argillaceous partings typical of most of the Rabbitkettle indicates deposition in a pelagic, or hemipelagic basinal setting below normal wave-base. There are few firm criteria for deciding whether individual lime mudstone beds represent normal pelagic, or hemipelagic deposition on a relatively flat basin floor, or whether they represent fine grained sediment gravity-flow deposits of resedimented carbonates in a basin-slope setting. The occurrence of small grainstone lenses of indistinct skeletal material in small scours along the bases of some beds suggests that at least some lime mudstone beds may be subaqueous mass-flow deposits.

Basin slopes during Rabbitkettle deposition could not have been great, otherwise larger, more recognizable mass-flow deposits and/or submarine slumps would have occurred. Also, there does not seem to be any development of a distinctive shelf-edge facies marking the transition from the shallow-shelf deposition of the Franklin Mountain Formation east of the Richardson trough to the Rabbitkettle within the trough. Instead, Franklin Mountain facies that are transitional to Rabbitkettle strata are simply open-marine, argillaceous, skeletal wackestones that are rhythmically or nodularly bedded. This indicates that the eastern margin of Richardson Trough was more likely to have been a carbonate ramp rather than a steep shelf–to–basin transition. The transitional Franklin Mountain limestones of Section 44 (MTA-82-9; Fig. 9) are typical of the argillaceous lime

Table 3
Mineralogy (X-ray diffraction) of selected lower Paleozoic shale samples from the study region

GSC locality number	Section	Formation	Mica %	Chlorite %	Quartz %	Calcite %	Dolomite %	Plagioclase %	K-Feldspars %	Other %
C-124505	MTA-82-1	Road River 75.0	1	0	66	29	4	0	0	Pyrite-tr
C-124535	MTA-82-5	Road River (288.0)	1	0	68	12	19	0	tr*	
C-124572	MTA-82-12	Road River (706.0)	tr	0	11	81	5	2	0	Pyrite-1
C-124573	MTA-82-12	Road River (631.0)	tr	tr	30	58	12	0	0	
C-124575	MTA-82-12	Road River (101.0)	2	2	31	63	tr	2	0	Pyrite-tr
C-124576	MTA-82-12	Road River (101.0)	5	4	70	1	16	4	0	
C-124578	MTA-82-12	Road River (84.0)	3	2	88	0	0	6	1	
C-124579	MTA-82-12	Road River (86.0)	7	5	75	1	4	6	tr	Pyrite-1; Baryte-1
C-124583	MTA-82-13	Road River 68.0	1	0	61	24	14	tr	tr	
C-124585	MTA-82-13	Road River 168.0	tr	0	72	23	5	0	0	
C-124586	MTA-82-13	Road River 238.0	tr	0	59	26	13	tr	1	Pyrite-1; Baryte-tr
C-124587	MTA-82-13	Road River 329.0	tr	0	80	20	0	0	0	Pyrite-tr
C-124588	MTA-82-13	Road River 419.0	0	0	23	77	tr	0	0	
C-124594	MTA-82-14	Road River 154.0	tr	0	70	18	11	0	1	Baryte-tr
C-124597	MTA-82-14	Canol 50.0	tr	0	100	0	0	0	0	
C-124601	MTA-82-15	Road River 210.0	tr	0	73	27	tr	0	0	
C-124603	MTA-82-16	Road River 220.0	tr	0	77	21	2	0	tr	
C-124605	MTA-82-16	Road River 300.0	tr	0	78	21	0	0	1	
C-124613	MTA-82-17	Road River 151.0	1	0	56	27	14	0	2	
C-128445	MTA-84-3	Road River (114.0)	0	0	tr	91	9	0	0	
C-128469	MTA-84-4	Road River (80.0)	tr	0	12	80	6	2	0	
C-128559	MTA-84-1	Road River 214.5	0	0	9	91	tr	0	0	
C-128562	MTA-84-12	Road River 365.0	2	0	59	24	13	0	2	
C-149453	MTA-86-2	Bouvette 639.0	0	0	16	83	1	0	tr	
C-150754	MTA-86-8	Road River 21.0	tr	0	61	39	0	0	tr	
C-150761	MTA-86-8	Road River (237.0)	2	0	45	48	1	1	1	Pyrite-1; Gypsum-1
C-150762	MTA-86-8	Road River (221.0)	tr	0	3	95	0	1	0	Gypsum-1
C-150763	MTA-86-8	Road River (217.0)	0	0	32	68	0	0	0	
C-150765	MTA-86-8	Road River (203.0)	tr	0	74	25	0	0	1	
C-150766	MTA-86-8	Road River (130.0)	tr	0	84	16	0	0	0	
C-150767	MTA-86-8	Road River (10.0)	1	0	99	0	0	tr	tr	
C-150798	MTA-86-11	Road River 45.0	tr	0	68	30	0	0	1	
C-150840	MTA-86-15	PreCambrian (1.0)	13	17	69	0	0		tr	Pyrite-1
C-150921	MTA-86-18	Canol (33.0)	2	0	96	0	0	tr	tr	Anatase-1; Jarosite-1
C-150922	MTA-86-18	Hart River 12.0	0	0	71	28	0	1	0	Apatite-tr
C-150942	MTA-86-20	Canol 1.5	1	0	95	0	0	tr	0	Jarosite-4
C-150943	MTA-86-20	Canol 54.0	1	0	98	0	0	tr	tr	Jarosite-1
C-150945	MTA-86-20	Canol 107.0	1	0	98	0	0	tr	tr	Jarosite-1
C-150947	MTA-86-20	Hart River 60.0	tr	0	84	13	0	3	0	
C-150970	MTA-86-23	Canol (28.0)	tr	0	94	6	0	0	0	
C-150981	MTA-86-25	Road River 10.0	tr	0	85	15	0	0	0	
C-150982	MTA-86-26	Road River (89.0)	0	0	47	46	7	0	0	
C-150985	MTA-86-26	Road river (54.0)	0	0	90	10	0	0	0	
C-151020	MTA-86-P2	Canol 1.0	1	0	98	0	0	0	0	Jarosite-1

Note: Trace amounts less than 1%

Parentheses indicate metres below top; no parentheses indicate metres above base

Table 4
Major element composition (X-ray fluorescence) of selected lower Paleozoic shale samples from the study region

GSC locality number	Fe_2O_3 %	MnO %	TiO_2 %	BaO %	CaO %	K_2O %	P_2O_5 %	SiO_2 %	Al_2O_3 %	MgO %	Na_2O %	SO_3 %	LOI %	Total
C-124505	0.74	0.01	0.13	0.03	21.25	0.74	0.10	54.77	2.50	1.11	0.03	0.00	18.60	100.01
C-124535	0.91	0.01	0.13	0.05	16.42	0.68	0.16	57.97	2.28	4.11	0.04	0.00	17.25	100.01
C-124572	1.12	0.01	0.05	0.01	47.04	0.33	0.17	9.80	1.09	1.27	0.12	0.00	39.00	100.01
C-124573	1.03	0.02	0.15	0.01	38.69	0.77	0.13	24.07	2.30	3.76	0.08	0.00	29.00	100.01
C-124575	3.38	0.06	0.27	0.13	35.20	1.81	0.06	25.10	5.41	1.14	0.19	0.00	27.25	100.00
C-124576	6.26	0.06	0.55	0.56	10.54	3.14	0.15	53.77	10.31	4.13	0.54	0.00	10.00	100.01
C-124578	4.43	0.01	0.64	2.00	0.58	2.96	0.66	72.17	9.95	1.08	1.52	0.00	4.00	100.00
C-124579	4.00	0.08	0.35	0.16	45.27	2.37	0.07	32.39	6.98	1.50	0.33	0.00	6.50	100.00
C-124583	1.01	0.01	0.16	0.04	20.42	0.91	0.11	51.14	2.86	2.77	0.06	0.00	20.50	99.99
C-124585	0.98	0.01	0.11	0.06	18.43	0.54	0.13	60.97	2.00	1.01	0.02	0.00	15.75	100.01
C-124586	1.15	0.01	0.15	0.05	19.46	0.80	0.11	52.87	2.83	2.97	0.08	0.00	19.50	99.98
C-124587	0.55	0.01	0.09	0.08	17.34	0.37	0.22	67.36	1.57	0.15	0.02	0.00	12.25	100.01
C-124588	0.24	0.01	0.02	0.02	45.82	0.06	0.05	15.67	0.41	0.43	0.02	0.00	37.25	100.00
C-124594	0.75	0.03	0.10	0.21	20.61	0.52	0.03	53.66	2.06	2.44	0.09	0.00	19.50	100.00
C-124597	0.26	0.00	0.18	0.92	0.13	0.78	0.06	91.36	3.51	0.24	0.06	0.00	2.50	100.00
C-124601	0.32	0.01	0.08	0.05	18.95	0.35	0.03	62.71	1.80	0.42	0.03	0.00	15.25	100.00
C-124603	0.84	0.01	0.17	0.02	15.16	1.31	0.10	64.21	3.52	0.88	0.03	0.00	13.75	100.00
C-124605	0.68	0.01	0.18	0.10	1.36	0.79	0.03	89.90	3.15	0.25	0.05	0.00	3.50	100.00
C-124613	1.48	0.02	0.23	0.25	23.00	1.22	0.17	44.25	4.30	3.04	0.03	0.00	22.00	99.99
C-128445	0.10	0.00	0.01	0.00	52.11	0.00	0.04	0.70	0.14	2.37	0.02	0.00	44.50	99.99
C-128469	0.31	0.01	0.06	0.00	46.68	0.17	0.06	9.19	1.00	1.66	0.11	0.00	40.75	100.00
C-128559	0.31	0.01	0.05	0.01	49.12	0.32	0.06	7.97	0.99	0.60	0.05	0.00	40.50	99.99
C-128562	1.61	0.02	0.26	0.25	22.10	1.35	0.24	46.83	4.63	3.16	0.05	0.00	19.50	100.00
C-149453	0.41	0.01	0.07	0.01	44.97	0.79	0.07	14.62	1.50	0.75	0.06	0.00	36.75	100.01
C-150754	0.57	0.01	0.13	0.01	26.56	0.95	0.24	46.44	2.40	0.41	0.04	0.00	22.25	100.01
C-150761	2.61	0.02	0.37	0.39	30.14	1.43	0.36	33.73	5.64	2.55	0.26	0.00	22.50	100.00
C-150762	0.78	0.02	0.07	0.07	53.10	0.25	0.16	3.44	1.08	0.69	0.08	0.00	40.25	99.99
C-150763	0.27	0.01	0.04	0.15	41.16	0.18	0.02	23.49	0.75	0.61	0.07	0.00	33.25	100.00
C-150765	0.53	0.01	0.09	0.67	26.53	0.55	0.02	54.69	2.08	0.28	0.05	0.00	14.50	100.00
C-150766	0.28	0.01	0.05	0.13	15.13	0.10	0.14	73.19	0.58	0.13	0.01	0.00	10.25	100.00
C-150767	0.89	0.01	0.30	1.47	0.21	1.26	0.07	87.64	5.08	0.42	0.15	0.00	2.50	100.00
C-150798	0.67	0.01	0.14	0.16	24.00	0.67	0.14	53.23	2.18	0.27	0.04	0.00	18.50	100.01
C-150840	7.81	0.07	0.78	0.18	0.34	4.56	0.28	62.05	18.32	1.95	0.40	0.00	3.25	99.99
C-150921	2.42	0.00	0.64	0.79	0.09	2.65	0.14	78.02	10.50	0.62	0.14	0.00	4.00	100.01
C-150922	0.49	0.00	0.09	0.13	22.22	0.24	0.55	57.78	1.42	0.28	0.06	0.00	16.75	100.01
C-150942	3.06	0.00	0.26	0.29	0.19	1.46	0.08	82.27	4.99	0.30	0.09	0.00	7.00	99.99
C-150943	1.36	0.00	0.30	0.41	0.06	1.37	0.06	86.79	5.28	0.29	0.08	0.00	4.00	100.00
C-150945	1.25	0.01	0.42	0.97	0.09	1.78	0.07	83.66	7.66	0.46	0.13	0.00	3.50	100.00
C-150947	1.30	0.01	0.24	0.37	10.32	0.41	0.20	76.66	3.47	0.17	0.34	0.00	6.50	99.99
C-150970	1.14	0.01	0.21	0.18	4.60	0.50	0.07	85.83	3.21	0.16	0.09	0.00	4.00	100.00
C-150981	0.21	0.01	0.04	0.07	12.68	0.28	0.06	73.72	1.00	0.16	0.01	0.00	11.75	99.99
C-150982	0.56	0.01	0.05	0.01	26.92	0.41	0.17	35.58	1.32	1.44	0.02	0.00	33.50	99.99
C-150985	0.37	0.01	0.09	0.06	9.03	0.39	0.04	79.37	1.49	0.15	0.02	0.00	9.00	100.02
C-151020	1.44	0.00	0.23	0.18	0.28	0.98	0.03	90.32	3.57	0.19	0.02	0.00	2.75	99.99

*See Table 3 for sample locations

Table 5
Metal and minor element content (ppm) (X-ray fluorescence) of selected Paleozoic shale samples in the study region

GSC locality number	Zn	Cu	Ni	Mn	Cr	Mo	Nb	Zr	Y	Sr	U	Rb	Th	Pb	Ba
C-124505	210	0	16	76	27	9	0	29	24	139	0	28	0	0	220
C-124535	241	0	50	83	25	12	0	37	18	173	0	21	0	0	481
C-124572	21	0	16	112	4	0	0	24	19	1627	0	14	0	0	163
C-124573	148	0	9	179	10	0	3	43	18	948	0	25	0	0	196
C-124575	7	0	53	587	14	10	0	76	20	721	0	83	0	0	1944
C-124576	32	0	51	506	25	0	8	115	30	146	0	139	0	0	3567
C-124578	104	0	77	99	52	0	6	101	8	61	6	117	0	0	5958
C-124579	18	42	49	762	19	0	4	97	25	932	0	105	0	0	2557
C-124583	51	0	18	122	14	12	0	56	19	420	9	31	0	0	386
C-124585	144	0	97	83	23	12	0	40	22	677	0	21	0	0	368
C-124586	465	6	112	102	28	11	0	41	18	824	0	28	0	0	424
C-124587	95	0	29	55	32	6	0	15	29	1521	0	16	0	0	488
C-124588	82	0	20	107	18	7	0	8	13	2090	0	0	0	0	589
C-124594	148	0	62	260	28	11	0	34	36	367	6	21	0	0	1833
C-124597	0	0	1	32	44	0	0	23	4	38	0	34	0	0	3421
C-124601	17	0	7	59	15	0	0	10	13	879	0	13	0	0	476
C-124603	87	0	48	95	24	4	0	31	14	167	6	32	0	0	151
C-124605	129	0	18	75	33	6	0	25	9	44	0	23	0	0	579
C-124613	125	0	150	154	26	43	0	75	29	593	10	53	0	0	2733
C-128445	0	0	29	33	10	0	0	0	0	2818	0	0	0	0	6
C-128469	18	0	0	104	9	0	0	37	16	2926	0	9	0	0	66
C-128559	14	0	26	105	5	0	0	15	11	600	0	8	0	0	302
C-128562	151	0	135	154	43	40	3	76	32	545	17	59	0	0	2440
C-149453	154	0	18	78	14	0	0	25	20	632	7	21	0	0	161
C-150754	42	0	48	63	32	0	0	27	28	370	0	25	0	0	154
C-150761	646	0	174	241	62	55	6	93	47	1517	9	75	0	0	5124
C-150762	181	0	60	293	25	9	0	43	42	1770	15	13	0	0	2288
C-150763	94	0	41	99	24	3	0	19	25	2667	0	10	0	0	6352
C-150765	300	0	64	96	40	16	0	28	40	1216	7	24	0	0	7488
C-150766	341	0	53	52	41	19	0	19	14	747	8	6	0	0	800
C-150767	2	0	14	38	32	0	0	40	8	41	5	55	0	0	4665
C-150798	198	0	80	105	46	11	0	24	18	413	8	24	0	0	1485
C-150840	85	8	82	539	32	0	10	168	19	105	0	0	230	16	-8
C-150921	0	25	46	35	40	0	5	88	20	65	0	124	6	0	2974
C-150922	107	0	23	49	29	0	0	25	28	459	0	12	0	0	1235
C-150942	8	49	53	33	25	43	0	42	7	52	0	52	0	0	1336
C-150943	0	0	35	29	22	6	0	47	13	30	4	51	0	0	1871
C-150945	0	0	34	33	23	0	3	57	13	61	0	79	0	0	4046
C-150947	46	0	64	49	48	0	0	87	15	256	0	23	0	0	2600
C-150970	29	0	28	41	31	0	0	34	9	94	0	28	0	0	1093
C-150981	60	0	6	63	30	0	0	15	7	124	0	11	0	0	490
C-150982	54	0	27	125	11	0	0	27	16	454	0	9	0	0	182
C-150985	63	0	20	43	27	4	0	11	8	241	0	9	0	0	401
C-151020	0	0	32	28	22	21	2	42	11	25	4	34	0	0	749

*See Table 3 for sample locations

wackestones that contain relatively well preserved, unfragmented and whole fossils, which commonly accumulate in deeper carbonate ramp settings (Read, 1985).

Loucheux strata contain features indicative of basin-margin, or basin-slope deposition. The presence of many thick, rubble floatstone debris flows containing reworked fragments of basinal lime mudstone is a clear indicator of slope deposition (McIlreath and James, 1984), as are the abundant synsedimentary slump folds and sedimentary boudinage observed in the Loucheux. No large blocks of shallow-water origin were observed in Loucheux debris-flow deposits, which may indicate that upslope shallow-water carbonates were not well cemented and not generally reefal. These characteristics are typical of a distally steepened type of carbonate ramp (Read, 1985). The lateral transition of the age equivalent, open-marine, probably outer, or deeper water shelf-type fossiliferous Mount Kindle dolostones to the basinal dark shaly limestones and shales of the Loucheux unit is more abrupt than the underlying transition of the peritidal Franklin Mountain dolostones to deeper water Rabbitkettle limestones in the Richardson Trough. This also may indicate a distally steepened type of ramp setting for the combined Loucheux–Mount Kindle stratigraphic package in which the distal, basinward submarine break in slope corresponds to the position of the Mount Kindle–Loucheux transition.

The Middle Ordovician age of much of the lower part of the Loucheux indicates that it also spans the time during the development of the sub-Mount Kindle unconformity, when the Mackenzie–Peel Shelf was exposed subaerially. There are no large intervals of detrital beds in the Loucheux obviously related to a period of widespread shelf erosion, although in the Loucheux unit at Trail Creek (Section 57) there are a number of thin, orange, silty and sandy bands along the bases of some beds that may represent erosion across the shelf. There are no other obvious indications of water depth variations during Loucheux deposition, which for the most part occurred in anaerobic, or euxinic basinal environments below wave base. The abundant black siliceous shale and chert-bearing intervals throughout the Loucheux are consistent with periods of deposition below the calcite lysocline (Scholle et al., 1983). The absence of lowstand deposits in the Loucheux indicates that the relative drop in sea level at the end of Franklin Mountain deposition did not influence sedimentation within Richardson Trough.

Dempster strata were deposited in much shallower water. The buff to orange weathering, grey and green burrowed argillite in the Dempster is indicative of deposition under more shallow-water, aerobic conditions than the Loucheux. The high silt content of Dempster strata is consistent with deposition during the sea-level lowstand that caused the development of the sub-Devonian unconformity beneath the Delorme Group on Mackenzie–Peel Shelf. The overlying Vittrekwa probably represents a return to deeper water conditions in the Richardson Trough. This led to deposition of graptolitic black shale intervals within the Vittrekwa, and coincided with the transgression that led to deposition of the Delorme to Hume sequence across Mackenzie–Peel Shelf.

The Road River Group across the Yukon Stable Block is not well exposed and only a few sedimentary features were observed, even within the thicker Road River sequences of Blackstone Trough. Mass-flow deposits are largely absent in the Road River of the Yukon Stable Block except near isolated carbonate platforms, such as the Royal Mountain Platform. This may indicate that basin slopes and sedimentation rates were generally low in this region. The upward transition of Road River to Michelle Formation argillaceous limestones beneath Ogilvie shelf carbonates is also an indication of a gradual shelf–to–basin transition during Road River deposition in this region.

Ordovician and Silurian unconformities and regional tectonics

Deposition of Ordovician and Silurian strata on the Yukon Stable Block and the Mackenzie–Peel Shelf began after the period of exposure represented by the sub-Cambrian unconformity. This stratigraphic package includes the upper, or Ordovician part of the Sauk Sequence and the entire Tippecanoe Sequence of Sloss (1963). No faunas were recovered from basal Bouvette beds across most of the Yukon Stable Block so the direction of transgression or onlap of Bouvette strata onto Ogilvie Arch is not certain. There is, however, evidence for a centripetally inward direction of onlap by Bouvette strata toward the centre of Ogilvie Arch in the east-central part of the Ogilvie River map area. This is based on the definite occurrence of *Elvinia* Zone middle Upper Cambrian fossils in the Bouvette Formation in the Illtyd Range near the easternmost limit of this unit in the Wind River map area (Fritz, 1997) and on the occurrence of an almost complete Cambrian and Ordovician sequence in the Jones Ridge Limestone at the western edge of the study area (Brabb, 1967; Fig. 9). A centripetally directed onlap of Ogilvie Arch by Bouvette strata is consistent also with the westward truncation of the underlying Slats Creek and Illtyd fomations, both of which, as discussed previously, have equivalents within the lower part of the Jones Ridge Limestone at the western edge of the study area on the west side of the Ogilvie River map area, but which are absent across most of the Ogilvie River and Hart River map areas.

Deposition of the Bouvette Formation marked the end of Ogilvie Arch as a significant paleogeographic feature. The isopach map of the Ronning Group and the Bouvette Formation (Fig. 15) clearly illustrates that during Bouvette deposition the former Ogilvie Arch became part of a

depocentre that extended across the entire Yukon Stable Block. During this period, the Mackenzie–Peel Shelf was itself a broad depocentre for the Franklin Mountain and Mount Kindle formations of the Ronning Group.

A major distinction between the Ordovician–Silurian of the Yukon Stable Block and the Mackenzie–Peel Shelf lies in the absence or presence of the Middle Ordovician unconformity in these areas. The unconformity separating the Mount Kindle Formation from the underlying Franklin Mountain Formation on the Mackenzie–Peel Shelf (Fig. 9) is part of the northern extension of the continent-wide unconformity that separates the Cambrian–Lower Ordovician Sauk Sequence from the overlying Upper Ordovician to Upper Silurian Tippecanoe Sequence (Cecile and Norford , 1993). This unconformity has no counterpart within the Ordovician–Silurian of the Yukon Stable Block. Instead, Middle Ordovician time on the Yukon Stable Block is represented by widespread basinal Road River shale deposition within Blackstone Trough and by shallow-water carbonate deposition in areas that bordered Blackstone Trough. This major difference in the interpreted relative sea level between the Yukon Stable Block and the Mackenzie–Peel Shelf can be explained as the consequence of a variety of possible combinations of differential subsidence and/or differential uplift.

Vail et al. (1977), on the basis of globally correlative, unconformity bounded and seismically defined sequences, or “cycles”, proposed a widely used sea-level change curve illustrating the amplitude and direction of sea-level changes during Phanerozoic time with respect to present-day sea level. They regarded this curve of secular sea-level variations to indicate global eustatic changes of sea level and to be independent of the effects of local, tectonically induced relative changes in sea level. They regard their “second-order cycles” to be the direct equivalent of the unconformity bounded sequences of Sloss (1963). One peculiarity of their sea-level curve is the pronounced asymmetry of their inferred sea-level rises and falls, with sea-level falls being very rapid, or geologically instantaneous in terms of the scale of their sea-level chart. Mitchum et al. (1977) argued that most sea-level falls on the Vail et al. (1977) sea-level chart occur in less than one-million-year time spans.

The absence of the Middle Ordovician unconformity between the Sauk and Tippecanoe sequences, and between two second-order cycles (Vail et al., 1977), from the the entire Yukon Stable Block is significant in the interpretation of the origin of this unconformity. It could be argued that little evidence for sea-level decline in the region of Blackstone Trough basinal deposition would be preserved, but certainly physical evidence for this unconformity should be apparent in areas of shallow-water carbonate deposition of the Bouvette Formation around Blackstone Trough. There is no physical evidence to indicate the existence of a large unconformity that might span Middle Ordovician time within the Bouvette Formation. Conversely, because of the scarcity of well preserved and diagnostic faunas it is not possible to directly prove that Middle Ordovician strata are, in fact, unequivocally present. There are, however, several faunal determinations from the upper part of the Bouvette in a number of sections that indicate either a Middle or Late Ordovician age (e.g., Section 42, MTA-86-2; Fig. 9). Also, there are probable Middle Ordovician faunas from Road River strata that are lateral facies equivalents of, and transitional lithologically to, Bouvette strata (see Section 16, MTA-82-15; in Fig. 9). A similar situation may occur in the isolated White Mountains Platform at the north end of Richardson Trough. Norford (1997) suggested that the shallow-water limestones of the Vunta Formation, which accumulated on the White Mountains Platform, represent all of Early Ordovician to mid-Early Silurian time.

This probable absence of the Middle Ordovician unconformity throughout large areas of shallow-water carbonate deposition in the northern Yukon may indicate that tectonism may also have had an influence on the development of this unconformity. It is unlikely that an abrupt, eustatic drop in sea level that caused continent-wide erosion in the manner suggested by Vail et al. (1977) would not also be manfested as an unconfomity within Bouvette strata. Instead, the inundation of a large portion of the Yukon Stable Block in Middle Ordovician time by basinal Road River deposition is a clear indication that relative sea level was rising rather than falling across the Yukon Stable Block during this time.

One factor which might explain part of this profound difference in the depositional history of the Yukon Stable Block versus that of the Mackenzie–Peel Shelf is the role of high-angle basement faults, such as the Knorr Fault, or other faults of the Richardson Fault Array (Norris, 1997), which separate the Yukon Stable Block from the Mackenzie–Peel Shelf (Fig. 9). Norris (1997a) suggested that major block faulting along this fault array caused erosion of many kilometres of Proterozoic strata on the west side of the array. It is possible that this fault array remained a zone of structural weakness so that the Yukon Stable Block was structurally decoupled from the Mackenzie–Peel Shelf region in Paleozoic time. This raises the possibility that the Yukon Stable Block underwent subsidence relative to the Mackenzie–Peel Shelf during Ordovician time. It also casts some doubt on the concept of a geologically instantaneous global mid-Ordovician sea-level fall. If this were true, an unconformity should still have been developed across parts of the Yukon Stable Block and across the White Mountains Platform. Eustatic sea-level changes during this time could not have been much greater than rates of tectonic uplift or subsidence in order to explain the absence of the Mid-Ordovician unconformity across the Yukon Stable Block.

The concept of a zone of crustal structural weakness and mobility along the axis of Richardson Anticlinorium and the Knorr Block is also supported by stratigraphic evidence from Ordovician strata in the vicinity of the Knorr Block. Strata mapped as Road River Formation directly overlie Precambrian strata of the Knorr Block and underlie Ogilvie Formation (Norris, 1982c; Fig. 9). Most of this rather thin Road River sequence is firmly dated as Early Devonian (Fig. 9; Appendix 6). The lowermost Road River beds at this section (Section 22, MTA-82-5) are inferred to be Ordovician and/or Silurian in age because of their lithological similarity to similar cherty basinal dolostones of the Ordovician–Silurian Whittaker Formation in the central Mackenzie Mountains and also because their upper contact is an unconformity that probably correlates with the sub-Devonian unconformity of the Mackenzie–Peel Shelf (Fig. 9). This suggests that an undetermined thickness of Ordovician–Silurian strata were eroded locally on the Knorr Block and that the Knorr Block was uplifted relative to both the Yukon Stable Block and the Mackenzie–Peel Shelf at some time between the Ordovician to earliest Devonian. The Knorr Block as a paleogeographic element coincides with the "Bonnet Plume High" of Lenz (1972) who also identified this region as a positive element during parts of early Paleozoic time.

A similar, but less obvious feature is present on the western edge of the study area, in the southwestern corner of the Ogilvie River map area. Section 25 (MTA-86-12) contains an anomalously thin Bouvette sequence that rests unconformably on the Helikian Gillespie Lakes Group (Fig. 9). This unconformity is distinctly angular. Less than a kilometre north of Section 25, Bouvette strata unconformably overlie still older Proterozoic strata of the Quartet Group (Fig. 20). Immediately east of this section, Bouvette strata overlie unnamed Precambrian strata largely equivalent to the Gillespie Lakes Group, but which may include strata as young as earliest Cambrian (Norris, 1982a; R.I. Thompson, pers. comm.). The Cambrian and Ordovician Jones Ridge Limestone in Section 21 (MTA-86-28) immediately west of Section 25, rests conformably on youngest Precambrian, or Hadrynian, strata of the Tindir Group (Fig. 9).

The relatively deep level of sub-Bouvette erosion in the vicinity of Section 25 can be interpreted as indicating that there was a high, possibly fault bounded, block in this area that locally caused deeper erosion of the Precambrian. This region probably remained as a positive feature during deposition of the Bouvette Formation and correlative strata of the Jones Ridge Limestone. Certainly this would explain the very thick Jones Ridge Limestone (915 m) at its type section immediately west of the study area, a large part of which is Cambrian in age (Brabb, 1967). A northern continuation of this early Paleozoic positive element may exist beneath the Mesozoic strata of the Kandik Basin, directly north of Section MTA-86-12 (Norris, 1982a).

Upper Silurian to Middle Devonian stratigraphy

Almost the entire area of the Mackenzie–Peel Shelf, as well as the region of the Dave Lord High on the Yukon Stable Block, were exposed subaerially during Late Silurian to earliest Devonian time (Fig. 35; Morrow and Geldsetzer, 1992), as were many other areas in the northern hemisphere (Sloss, 1963). In the Mackenzie–Peel Shelf sequence, this period of exposure corresponds to the unconformity developed beneath Delorme Group strata. This unconformity is continuous with the "sub-Devonian" unconformity of the continental interior (Morrow and Geldsetzer, 1992; Sloss, 1963), although on distal parts of the Mackenzie–Peel Shelf, Upper Silurian strata of the Delorme Group rest on this unconformity (Morrow, 1991). On the Dave Lord High, the unconformity beneath the Mount Dewdney Formation may correlate with the "sub-Devonian" unconformity of the Mackenzie–Peel Shelf. This unconformity is also part of the major interregional unconformity that separates the Ordovician–Silurian Tippecanoe Sequence from the overlying Devonian to Mississippian Kaskaskia Sequence of Sloss (1963; Morrow and Geldsetzer, 1992). Basinal deposits of the Road River Group accumulated throughout the rest of the Yukon Stable Block during this Late Silurian to Early Devonian time of exposure in a rather condensed basinal sequence, except for isolated areas of platform carbonate deposition (e.g., Royal Mountain Platform). Road River deposits in Richardson Trough that accumulated in mid-to late Silurian time, such as the Dempster subdivision of the Road River Group (Cecile et al., 1982), exhibit features indicative of a more shallow-water and oxygenated basinal depositional environment than the darker shales of the underlying (Loucheux) and overlying (Vittrekwa) units.

The brightly coloured peritidal and supratidal deposits of the Delorme Group and Mount Dewdney formations were deposited from latest Silurian to earliest Devonian time during the initial Kaskaskia marine transgression across the exposed hinterlands of the Mackenzie–Peel Shelf and the Dave Lord High. Across the Yukon Stable Block a thin sequence (less than 100 m) of Road River silty and dolomitic shales accumulated in basinal areas contemporaneous with this initial transgression. In Richardson Trough, this coincided also with the deposition of a thin sequence, including the uppermost part of the Dempster and the lowermost part of the Vittrekwa (Fig. 19) beds.

Continuation of marine transgression led to deposition of the rest of the Lower (Emsian) to Middle (Eifelian and Givetian) Devonian shallow-water platform carbonate

sequence of the Mackenzie–Peel Shelf, including the Arnica, Landry and Hume formations. These units have a recognizable pattern of deposition as distinct progradational, or regressive sedimentation cycles in which platformal carbonates aggraded to sea level and prograded westward to the edge of the Mackenzie–Peel Shelf (Morrow, 1991; Morrow and Cook, 1987; Noble and Ferguson, 1971). This continued sea-level rise on the Mackenzie–Peel Shelf was interrupted by one notable sea-level fall in earliest Middle Devonian time. Buff and greenish siltstones, shales and argillaceous limestones of the Mount Baird Formation were deposited as a sea-level lowstand deposit near the shelf edge in a manner similar to the Funeral Formation in the south-central part of the Mackenzie Mountains (Morrow and Geldsetzer, 1992).

On the Yukon Stable Block, Lower to Middle Devonian sedimentation followed a different pattern than on the Mackenzie–Peel Shelf. In the region of Blackstone Trough, undifferentiated carbonate masses of shallow-water limestones of the Bouvette Formation accumulated on isolated platforms, such as Royal Mountain Platform, which shed periplatform carbonate debris into surrounding areas of basinal Road River shales. These isolated, and rather localized platforms tended to shrink in area during deposition. Blackstone Trough itself was dominated by basinal deposition of the Road River Formation during this time.

On the Yukon Stable Block outside Blackstone Trough, Road River basinal shale deposition was abruptly replaced by basin-slope and shelf-margin deposition of the fossiliferous and argillaceous, Emsian Michelle Formation and the shallow-water, clean platform carbonates of the Ogilvie Formation (Fig. 9) in a single, large-scale shallowing-upward and progradational sequence. Shortly after the beginning of Ogilvie deposition, sea-level rise outpaced sedimentation and the area of Ogilvie deposition shrank progressively with time until by earliest Givetian time, Ogilvie deposition continued at only a few small localized areas (Norris, 1985, 1997). In three dimensions, the reconstructed, predeformational shape of the Ogilvie Formation resembles a vast carbonate pancake with a rather flat base and slightly convex-upward upper surface, which has itself been called the Porcupine Platform (Perry et al., 1974). Blackstone Trough maintained its identity during Ogilvie deposition as a region of dominantly basinal Road River shale and slope limestone deposition south and east of the Porcupine Platform region.

A rapid rise of sea level in Givetian time led to deposition of the euxinic siliceous black shales of the Canol Formation uniformly across the entire Mackenzie–Peel Shelf and the Yukon Stable Block (Fig. 9; Williams, 1983; Morrow and Geldsetzer, 1992). As discussed previously, Canol shales directly overlie the Road River Group in the Richardson and Blackstone troughs and overlie the Ogilvie Formation in other parts of the Yukon Stable Block (Fig. 9, 22). Deposition of the Canol, and its westward continuation toward Alaska, the McCann Hill Chert, marked the end of shallow-water, carbonate platform deposition across all lower Paleozoic shelf areas in the study region, as well as across most of northern Canada (Morrow and Geldsetzer, 1992). Canol deposition approximately coincided with the onset of the Taghanic Onlap, which eventually covered all Middle Devonian carbonates across North America with a blanket of deeper water siliciclastic sediments (Johnson et al., 1985).

Delorme Group

Delorme Group in the Mackenzie and Franklin mountains region

The Delorme Group (Morrow, 1991; Williams, 1996; see also Morrow and Cook, 1987) includes strata of the former Delorme Formation, which was named and mapped in the southern Mackenzie and Franklin mountains (Douglas and Norris, 1961). At its type section on Whittaker Anticline, bright yellowish orange weathering siltstones, shales and dolostones of the Delorme conformably overlie the Whittaker Formation, and are conformably overlain by the Camsell Formation. However, more sandy homotaxial strata have also been mapped as Delorme Formation northward throughout the Mackenzie and Franklin mountains and eastward toward the Interior Plains where they directly overlie the sub-Devonian unconformity separating Delorme strata from underlying strata of the Mount Kindle Formation (e.g., Aitken and Cook, 1974a, b). Morrow (1991) and Meijer-Drees (1993) applied the name Tsetso Formation to these Delorme-like strata in the outcrop belt and in the subsurface of the Interior Plains. Strata recognized as homotaxial with, and similar to Delorme strata have been mapped as the SD (unnamed Upper Silurian–Lower Devonian) map unit at the north end of the Mackenzie Mountains in the Upper Ramparts River (106G) map area (Aitken et al., 1982) and mapped as the SDd (unnamed Upper Silurian–Lower Devonian) map unit in the Snake River (106F) map area (Norris, 1982d). All of these Delorme-like strata, including the Tsetso Formation and the former Delorme Formation, have been included in the Delorme Group of Morrow (1991) and Williams (1996).

In the northern Mackenzie Mountains, Delorme strata also include equivalents of the Camsell Formation breccias (Morrow, 1991). In the western part of the Mackenzie Mountains, Gabrielse et al. (1973) also noted that the contact between the Camsell and Delorme is arbitrary and difficult to map at a 1:250,000 scale and that Delorme strata include Camsell-like breccias at many localities. The contact between Delorme and Camsell strata is dominantly one of

facies equivalence, with a tendency for Camsell strata to overlie Delorme, or Tsetso strata (Morrow, 1991). Consequently the Delorme Group, as defined by Morrow (1991), also includes the Camsell Formation (see also Williams, 1996).

Regionally, the brightly coloured Delorme Group is overlain by the brownish grey, clean carbonates of the Arnica and Bear Rock formations and, in the western Mackenzie Mountains, by the light grey carbonates of the Sombre Formation (Morrow and Cook, 1987; Morrow, 1991). Over most of its extent, the Delorme Group unconformably overlies the Mount Kindle Formation, except near Selwyn Basin along the western edge of the Mackenzie Mountains, where Delorme strata interfinger with basinal Road River shales and in Root Basin where Delorme strata conformably overlie the basinal shales and dark dolostones of the Whittaker Formation (Morrow and Cook, 1987). The Delorme Group as a whole is an easily mappable stratigraphic package of brightly coloured, silty to sandy dolostones sandwiched between drab, grey to brown, clean carbonates of the Ronning Group and the Arnica Formation in the Mackenzie and Franklin Mountains region. However, northward and westward extensions of the Delorme Group beyond the Mackenzie Mountains have proved to be more problematic.

Delorme Group in the Peel Plain and Richardson Mountains

Delorme strata have not been mapped north of the Mackenzie Mountains into the Peel Plain area, although equivalent strata have been included in a number of unnamed map units. Cook and Aitken (1975) identified an unnamed Upper Silurian unit of argillaceous dolostone containing fish fragments and unconformably overlying the Mount Kindle Formation in the subsurface of the Travaillant Lake (106-O) map area in Peel Plain east of the Richardson Mountains (Fig. 1, 2). They regarded this unit as being equivalent to the "Delorme Formation of the southern Mackenzie Mountains" (Cook and Aitken, 1975, p. 5). Earlier, Mackenzie (1974) correlated strata in the completely cored C.D.R. Tenlen Lake A-73 well in the northeast corner of the Upper Ramparts River (106G) map area (65°52'07"N; 130°43'21"W) beneath the Lower limestone member of the Gossage Formation of Tassonyi (1969), or beneath the Tatsieta Formation of Pugh (1983), with a "Lower Devonian to Upper Silurian" sequence equivalent to the Delorme Formation. He also opined that the Gossage Lower limestone member should be included in this "Delorme Formation equivalent" stratigraphic package (Mackenzie, 1974, p. 266). Norris (1981f) mapped an Upper Silurian–Lower Devonian map unit (map unit SDD) of orange weathering dolomite and limestone in the White Mountains area of the northern Bell River map area (116P) which he named "Delorme?". Norris (1985) assigned these beds to an "unnamed carbonate unit" and described it as an orange weathering argillaceous dolomite and greenish grey, silty limestone containing fish (ostracoderm) fragments in the Snake River (106F) map area. He simply refers to these strata as "unnamed beds" in the White Mountains. Morrow (1989) affirmed that these beds correspond to most of the Delorme? Formation mapped by Norris (1981f) in the White Mountains and presented a detailed stratigraphic section of Silurian to Permian strata exposed in the White Mountains. Morrow (1989) speculated that the White Mountains may have been part of a peninsula extending northwestward from the Mackenzie–Peel Shelf region during deposition of Upper Silurian and earliest Devonian strata.

Pugh (1983; Fig. 4) erected two additional units in the subsurface of the Peel and Anderson plains, the Peel and Tatsieta formations, which together correspond to the "Upper Silurian–Lower Devonian" interval that was mapped as the Delorme Formation, or as Delorme-equivalent, in the northern Mackenzie Mountains (e.g., Aitken and Cook, 1974a). As previously discussed, Pugh (1983) regarded the sub-Devonian unconformity as being beneath the Tatsieta, or, in other words, to be within Delorme-equivalent strata of Peel Plain. This study concludes that there is no real basis for placing the position of the sub-Devonian unconformity within Delorme-equivalent strata of the Peel Plain area. Pugh's (1983, 1993) nomenclature of Peel and Tatsieta formations is retained, but both of these formations, rather than only the Tatsieta itself, are considered to be part of the Delorme Group, which is extended northward in this study to the Peel and Anderson plains.

The contact between the "Ronning Formation" and the overlying "Gossage Formation", as originally chosen by Tassonyi (1969), was in an area where strata equivalent to the Delorme are relatively thin. Tassonyi (1969) simply segregated these strata into two parts, an upper, more calcareous interval, which he assigned to the "Lower limestone member" of the "Gossage Formation" and a lower, more dolomitic interval, which he assigned to his "Ronning Formation". MacKenzie (1974) recognized that, in spite of their lithological differences, both of these lower Gossage intervals bear a much closer sedimentological similarity to each other than they do to underlying (Mount Kindle Formation) or overlying (Arnica or "Gossage Dolomite member") strata, and that both intervals could be regarded as being equivalent to the Delorme Formation of previous usage.

These important observations and conclusions were not recognized by Pugh (1983, 1993), who chose to extend the sub-Devonian unconformity rigorously westward beneath strata of the type "Gossage", without recognizing the importance of the sub-Delorme unconformity that was well established in the far more complete Delorme sequences in

the Mackenzie Mountains (Morrow, 1991; Williams, 1996). This led to a fundamentally incorrect stratigraphic position for the sub-Devonian unconformity (Pugh, 1983, 1993) although the Peel and Tatsieta formations, as established by Pugh (1983), remain valid stratigraphic units.

Delorme Group equivalent strata west of Richardson Mountains

Delorme-like strata are not present across most of the Yukon Stable Block and have not been mapped anywhere in this region (e.g., Norris, 1981a, 1982a, b, c). Nonetheless, Pugh (1983) extended the Peel and Tatsieta formations westward across the entire Yukon Stable Block (Fig. 4). These long-distance subsurface correlations of Pugh (1983) were not supported by the stratigraphic studies of Norris (1985), who found that the Upper Silurian and Lower Devonian strata of outcrop sections west of the Richardson Mountains contained no recognizably Delorme-like units (Fig. 4). The results of the present study reaffirm, to a large extent, the conclusions of Norris (1985; Fig. 5). Pugh's (1983) tentative correlation of the Tatsieta strata with the Michelle Formation west of the Richardson Trough is not supported by lithostratigraphic or biostratigraphic evidence, or by sedimentological analysis. The Michelle Formation is formed of totally subtidal, shelf margin and basin slope strata that bear no resemblance whatsoever to the peritidal and supratidal deposits of the Tatsieta. Strata west of Richardson Mountains that are homotaxial with the Delorme Group are contained within basinal shales of the Road River Formation, or within the shallow-water, clean, Bouvette Formation carbonates that formed isolated platforms during the Blackstone Trough region during Late Silurian to earliest Devonian time.

In the region of Dave Lord High on the west side of the Yukon Stable Block, strata of the Mount Dewdney Formation are similar, and could be considered to be equivalent to, the Delorme Group. They are not included within the Delorme Group itself because of their long-distance physical separation from strata of the Delorme Group on the Mackenzie–Peel Shelf.

Peel Formation

Definition and age. The Peel Formation was named and defined by Pugh (1983, p. 21) for a sequence of light coloured, microcrystalline to finely crystalline, slightly argillaceous and silty dolostone that abruptly and unconformably overlies the darker, nonargillaceous dolostones of the Mount Kindle Formation in the subsurface of the Peel and Anderson plains. It is overlain by shaly limestones of the Tatsieta Formation (Fig. 41). The type section for the Peel Formation is in the Pacific Peel YT F-37

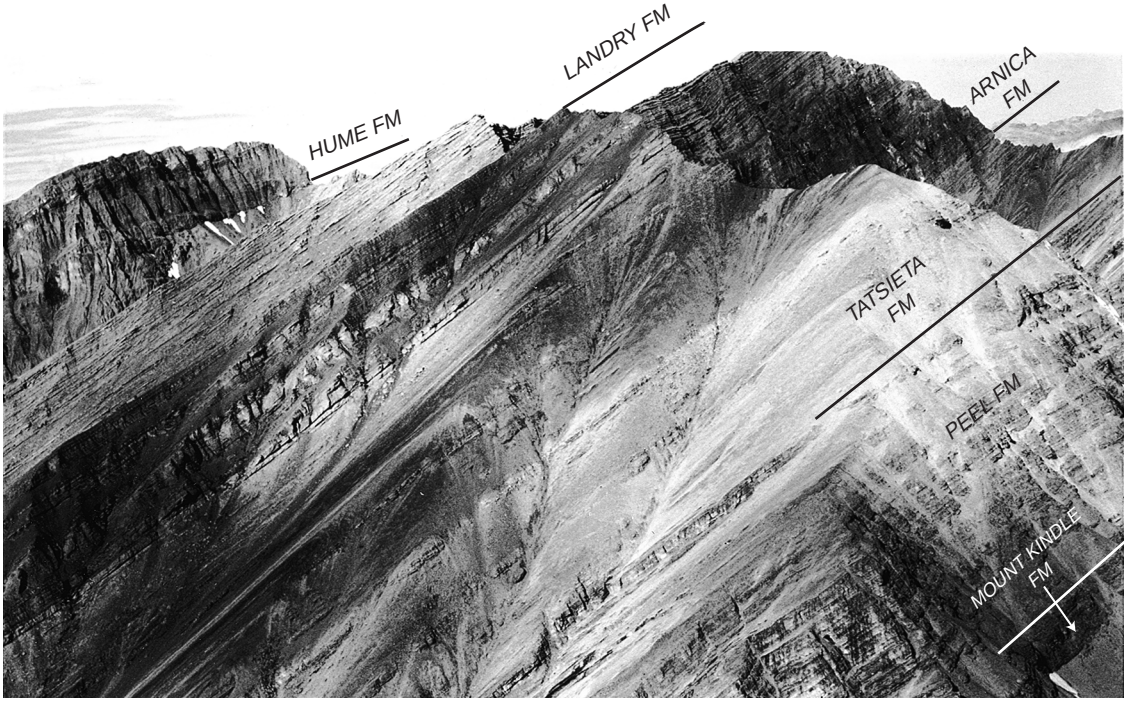


Figure 41. *View northward of the lower Paleozoic strata at Section 19 (MTA-82-6) where yellowish orange, silty and sandy carbonates of the Delorme Group (Tatsieta and Peel formations) mark the base of the Devonian succession in the northern Mackenzie Mountains in the Snake River map area (106F). (GSC Calgary photo 4298-13.)*

borehole (Fig. 6, 35), where it is composed of 341.4 m (corrected from the 350 m cited by Pugh, 1983) of pale buff (i.e., yellowish brown or light brown), pale grey and grey buff to cream, aphanitic and microcrystalline dolostone that contains numerous argillaceous and silty stringers, particularly in the lower part of the unit, which contains slightly pyritic dark grey and green shale partings, or stringers. Pugh (1983) noted that calcareous intervals, and even limestones can occur at some horizons within the Peel. As discussed previously, the Peel Formation, in this study, is restricted in its distribution to the Mackenzie–Peel Shelf, east of the Richardson Mountains.

The age of the Peel Formation probably ranges from Late Silurian to earliest Devonian (Pugh, 1983), although almost all of the direct age dates cited by Pugh (1983) are from faunas collected in strata west of the Richardson Mountains and are not included in the geographically restricted Peel Formation of the present study. The best evidence in support of a Late Silurian to earliest Devonian age for the the Peel Formation lies in its correlation from the subsurface to strata of the Delorme Group exposed along the northern Mackenzie Mountains (Fig. 17, 18). These strata have been dated as Late Silurian to earliest Devonian, within the conodont *eosteinhornensis* to *eurekaensis* zones (Chatterton in Morrow, 1991).

Distribution, thickness and contact relations. The Peel Formation occurs throughout the subsurface of the Mackenzie–Peel Shelf. Peel strata were penetrated in twenty wells in this area (Appendix 3) with fourteen of these wells containing a complete Peel succession (Appendix 4). The thickest subsurface Peel Formation section is 341.4 m in the type section at Pacific Peel YT F-37, and the thinnest subsurface section is 112.8 m in Shell Tree River East H-57. The average thickness of the Peel in the subsurface is about 220 metres and it displays moderate thickness variations in a north–south direction across the Peel and Anderson plains (Fig. 10). Direct lithostratigraphic correlations can be made between the Peel in the subsurface of the Peel Plain and Delorme strata mapped along the northeastern margin of the Mackenzie Mountains (Fig. 17, 18). Consequently, strata of the Delorme Group in outcrop have been subdivided into the Peel and Tatsieta formations in three outcrop sections (Appendices 1, 5).

In outcrop, the Delorme Group in the northern Mackenzie Mountains commonly displays a tripartite subdivision (Morrow, 1991), with a lower, recessive, silty to slightly sandy, orange weathering, mudcracked dololaminite passing upward to a light grey or cream coloured, resistant, locally biostromal, cliff-forming interval that contains some beds of reworked carbonate beachrock, and finally up to a bright orange to yellowish orange weathering, argillaceous dololaminite and thin bedded limestone containing abundant reworked platy lime mudclasts and mottled with yellowish green argillaceous material (e.g., Delorme Group in Section 19, MTA-82-6). This upper, more calcareous subdivision of the Delorme Group probably corresponds to the Tatsieta Formation. The underlying lower and middle subdivisions of the Delorme sequence probably correspond to the Peel Formation (Fig. 18).

Pugh (1983) suggested that the regional thickness variations of the Peel were the consequence of sub-Tatsieta erosion. However, no evidence for a distinctive break or erosional unconformity can be seen in correlative strata of the Delorme Group in outcrop. The fact that the thickness of the combined Peel and Tatsieta formations, or the Delorme Group, is remarkably uniform across the entire Mackenzie–Peel Shelf (Fig. 35) supports the concept that the Delorme Group, including the combined Peel and Tatsieta formations, can be regarded as a depositional unit that accumulated across the shelf without major interruption. The fact that thicker Peel sequences are overlain by thinner Tatsieta sections and vice versa is also consistent with the interpretation that, to some extent, the Peel and Tatsieta are lateral facies equivalents, with the lower parts of thicker Tatsieta equivalent to the upper parts of nearby Peel (Fig. 10).

Pugh (1983) also described an abrupt increase in thickness of the Peel westward from the Shell Tree River East H-57 well (Fig. 10) to the Shell Tree River F-57 well, over a distance of less than one kilometre (Fig. 7), in support of the concept of a pronounced pre-Tatsieta erosion episode. Pugh's choices for the upper and lower contacts of the Peel and Tatsieta formations in these wells resulted in the western well having 40 m more Peel strata and 36 m more Tatsieta strata than the eastern well. He suggested that these abrupt thickness variations were caused by post-Peel faulting and erosional thinning of the Peel section beneath the Tatsieta in the eastern well. Re-examination of well logs led to the choice of a different set of formational contacts for the Delorme Group so that the thickness differences of the Delorme Group and the Peel and Tatsieta formations between the H-57 and F-57 wells are all less than 10 m (Appendix 4). Consequently, there is no need to invoke a sub-Tatsieta regional erosional event of a magnitude that could indicate that a sub-Tatsieta unconformity is part of the "sub-Devonian unconformity" of the Mackenzie Mountains.

The lower contact of the Peel Formation with the underlying Mount Kindle Formation is well exposed in sections along the northern Mackenzie Mountains. At Section 19 (MTA-82-6) the upper surface of the Mount Kindle is irregular and is stained yellowish orange. Yellowish orange staining has penetrated downward into upper Mount Kindle beds. At Section 30 (MTA-82-4) the upper contact of the Mount Kindle is very irregular. Deep hollows along the contact are partly lined with ferroan, rusty weathering, coarsely crystalline dolomite. Abundant, white

dolomite-cemented rubble and mosaic packbreccias that may have had, at least in part, a solution collapse origin occur within the uppermost Mount Kindle beds at this section. This physical evidence for subaerial erosion and karstification of the Mount Kindle Formation before deposition of the Peel Formation indicates that the "sub-Devonian unconformity", or sub-Kaskaskia unconformity, is beneath the Peel Formation in the subsurface of the Peel Plain.

Similar evidence for sub-Peel erosion may be seen farther north in the White Mountains, at sections MTA-88-2 and MTA-88-3 (Appendix 5), where the Peel Formation overlies an undulatory to irregular erosional surface at the top of the Mount Kindle Formation (see Morrow, 1989). In the subsurface, the lower contact of the Peel with the Mount Kindle is commonly marked by a pronounced gamma-ray log radioactive spike and a corresponding sonic log decrease in acoustic velocity (Fig. 10, 17) consistent with a sub-Peel unconformity.

Lithology and internal markers. In outcrop sections, the Peel Formation is composed largely of yellow to yellowish grey dolostone with some dolomitic lime mudstone beds. Typically, in outcrop sections, the Peel Formation becomes more resistant upsection, but the very uppermost Peel beds tend to be less resistant (Fig. 41). The recessive lower beds are yellow dololaminite interbedded with yellowish grey, dolomitic, thin bedded, lime mudstone. Grey lime mudclasts are common within yellow dololaminites. Polygonal mudcracks are common at some horizons in the lower, recessive Peel beds and, in many places, mudcracks have been infilled with finely crystalline, silty yellow dolomite that probably had a largely detrital origin. Flaggy, grey, lime mudstone beds that occur sporadically in the lower part of the Peel Formation in some sections (e.g. Section 30) commonly have green, argillaceous partings. Some beds in the lower Peel Formation display distinctive oxidation patterns beneath hardground surfaces (Fig. 42) which may be oxidation haloes around the root systems of primitive plants, or less likely, around burrow-fillings. Bright-orange weathering, medium to thick, solitary beds of silty to sandy (fine sand) dolostone with a distinctive blocky parting and conchoidal fracture occur in the lower part of the Peel Formation of some sections. These sandy beds resemble the silty and sandy beds of the Tsetso Formation in the Delorme Group of the north-central part of the Mackenzie Mountains (Morrow, 1991).

The upper, resistant part of the Peel Formation is formed of medium to thick beds of more open-marine, light grey weathering dolostone. In Section 19, stromatolitic dololaminite, commonly containing fenestral fabric, scattered beds of amphiporid floatstone, and beds containing detrital carbonate mud chips (possibly beach zone deposits), form these resistant, upper beds. In Section 30, the resistant

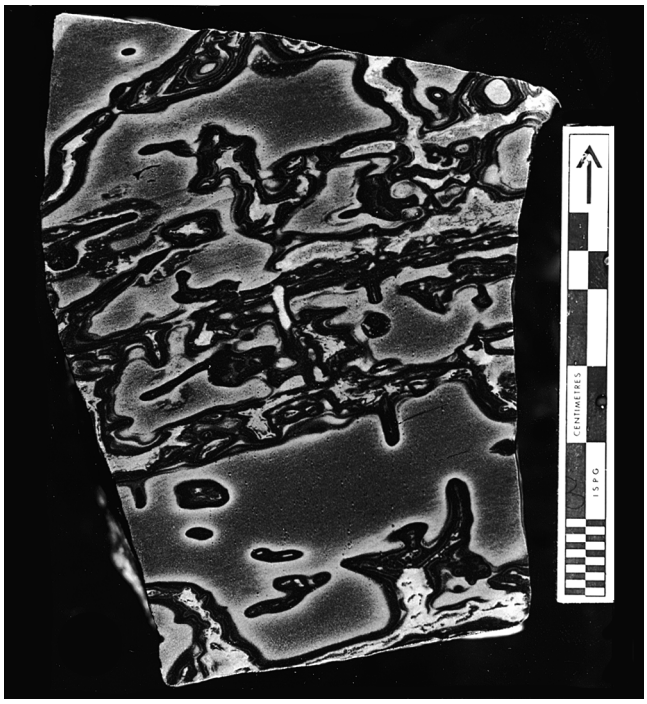


Figure . *Red oxidation haloes (dark) possibly outlining former rootlets or burrows in patterned yellow dolomudstone near the base of the Peel Formation in the Delorme Group in Section 0 (MT - 82-4). (9 m above section base GSC Calgary photo 416 -24.)*

part of the upper Peel is formed of medium bedded, grey lime mudstone beds that grade upward to yellow dololaminite in at least eight bedding cyles. In Section 27 (MTA-82-11), beds equivalent to the resistant, upper part of the Peel have been assigned provisionally to the Tatsieta Formation (sensu Pugh, 1983) because these beds are dominantly limestone (mudcracked lime mudstone) rather than dolostone. These beds strongly resemble the resistant beds of the Peel Formation in Section 30 (see Appendix 5). This resemblance between upper Peel beds and lower Tatsieta beds reinforces the concept that the Peel and overlying Tatsieta formations are partly facies equivalent (see also Williams, 1996). It is clear from the few examined outcrop sections of the Peel Formation that lateral facies changes are common, and regional marker units are not recognized.

Pugh (1983) and Williams (1996) give lithological descriptions of the subsurface Peel Formation in the area covered by this study. The salient characteristic of the subsurface occurrence is that it is an argillaceous or shaly dolostone with a very "ragged" (Williams, 1996) gamma-ray log response, in which individual log spikes, or responses, cannot be used as internal markers for correlations between well sections. Subdivisions or zones with similar log characteristics within the Peel can be correlated between

closely spaced wells, such as between the Shell Tree River East H-57 and Shell Tree River F-57 wells, but even here, individual log spikes or excursions cannot be correlated. Lowermost Peel beds are particularly shaly and contain green shale partings and small, shale-filled cavities. Silty dolostones are common near the base of the formation. Peel dolostones in the subsurface are commonly cream to light brown coloured. Williams (1996) noted the presence of fossilized algal mats and of birds-eye, or fenestral textures.

Depositional setting. Overall, Peel deposition is a record of intertidal to supratidal deposition. The abundant mudcracks and the bright yellow and orange coloration of the lower Peel attest to subaerial exposure during deposition on supratidal flats. Imbricate breccia deposits of lime mudclasts, which are probably storm deposits, or possibly even beach ridge deposits, also indicate multiple exposure surfaces. The absence of marker beds, or horizons, is consistent with a shoreface setting that was highly irregular in plan view and one that underwent rapid and nonuniform marine trangressions and regressions across an irregular surface. The dominantly supratidal aspect of the lower Peel grades upward to a more peritidal aspect in the upper Peel with a significant number of shallow subtidal and intertidal, more open-marine, grey carbonates.

Tatsieta Formation

Definition and age. The Tatsieta Formation was defined and named by Pugh (1983) for the thin, but regionally developed, limestone and green shale unit known previously as the Lower limestone member of the Gossage Formation of Tassonyi (1969). The Gossage Formation itself is now considered to be an obsolete formation (Pugh, 1983) and is also regarded here as obsolete. Its three constituent members, in ascending stratigraphic order – the Lower limestone member, the Dolomite member and the Pellet limestone member – have been replaced respectively by the Tatsieta, the Arnica, and the Landry formations (Pugh, 1983; see also Aitken et al., 1982). The Tatsieta type section is in the R.O.C. Grandview Hills No.1 well (A-37g) located near Tatsieta Lake east of the study area.

The Tatsieta Formation at its type section consists of 61 m of pale buff lime mudstone, some of which has a pale chalky texture and includes some light grey, very silty dolostone (Pugh, 1983). Pugh (1983) regarded the lower contact of the Tatsieta with the underlying Peel Formation to be part of the "sub-Devonian" unconformity. However, as discussed previously, there is no direct physical evidence for the existence of a regional unconformity at the base of the Tatsieta. Instead, the relatively uniform thickness of the entire Delorme Group, including both the Tatsieta and Peel formations, indicates that these units are partly facies equivalents and that the contact between them is conformable and diachronous in places.

MacKenzie (1974) correlated strata in the completely cored C.D.R. Tenlen Lake A-73 well (65°52'07"N; 130°43'21"W) beneath the Lower limestone member of the Gossage Formation of Tassonyi (1969) (the Tatsieta Formation of Pugh, 1983), with a "Lower Devonian to Upper Silurian" sequence equivalent to the Delorme Formation, and offered the opinion that the Lower limestone member of the Gossage should be included in this "Delorme Formation equivalent" (MacKenzie, 1974, p. 266). MacKenzie (1974) pointed out that the upward transition from the shallow-water limestones of the Lower limestone member (Tatsieta) to the darker dolostones of the Gossage Dolomite member (Arnica) was more significant sedimentologically than the transition between strata equivalent to the Peel and Tatsieta formations in the Tenlen Lake well.

The age of the Tatsieta is not well defined, but on the basis of its stratigraphic position beneath the Arnica Formation, it is probably earliest Early Devonian, or pre-Emsian in age. There were no faunal collections from this rather depauperate unit to improve on previous estimates for its age.

Distribution, thickness and contact relations. The Tatsieta Formation, like the Peel, occurs throughout the subsurface of the Mackenzie–Peel Shelf region. Complete Tatsieta sequences were penetrated in 20 wells (Appendices 3, 4). The thickest subsurface Tatsieta section is 193.5 m in the Shell Tree River East H-57 well and the thinnest section is 14.3 m in the Shell Arctic Red River O-27 well. The average thickness of the Tatsieta in the subsurface is about 58 m. It displays moderate thickness variations, and across most of the study area it departs from the average thickness by no more than 25 m, except at a few locales, where locally it is much thicker and the underlying Peel Formation is correspondingly thinner (Fig. 10), as it is between the closely spaced Shell Tree River F-57 and Shell Tree River East H-57 wells. Direct lithostratigraphic correlations can be made between the Tatsieta Formation in the subsurface of the Peel Plain and uppermost Delorme strata mapped along the northeastern margin of the Mackenzie Mountains (Fig. 17, 18). Like the Peel Formation, the thickness of the Tatsieta has not been mapped here because of the sparseness of the data set and, more importantly, because the thickness of the Delorme Group as a whole is a more significant genetic package than any of its separate component formations.

The base of the Tatsieta Formation is considered to be conformable, and locally diachronous. In outcrop, the Tatsieta exhibits both sharp and gradational contacts. For example, recessive, brightly coloured Tatsieta limestones at Section 19 (MTA-82-6) exibit an abrupt lower contact with

resistant Peel dolostones. On the other hand, Tatsieta strata in Section 30 (MTA-82-4) have a gradational contact with underlying Peel strata, and in Section 27 (MTA-82-11), it is difficult to demarcate Tatsieta and Peel strata. In subsurface sections the Tatsieta–Peel contact is also difficult to pick because of their similar geophysical log characteristics (Pugh, 1983, p. 26).

The upper contact of the Tatsieta with the overlying Arnica Formation is sharp and well defined in outcrop and in the subsurface. At all outcrop sections bright yellow and orange, silty and argillaceous Tatsieta dolomitic limestones are overlain abruptly by darker, greyish brown, clean, moderately fossiliferous dolostones of the Arnica Formation. There is no evidence of pre-Arnica erosion either locally or regionally. This contact probably reflects an abrupt, moderate deepening event, or sea-level rise at the beginning of Arnica deposition, as suggested by both Pugh (1983) and MacKenzie (1974).

Lithology and internal markers. As previously discussed, Tatsieta strata are similar to underlying Peel strata, and particularly to the lower, more recessive part of the Peel. Tatsieta strata are distinguished from underlying Peel strata on the basis of limestone content, where resistant Peel dolostones pass upsection to limestone (Fig. 9, 17). Like the Peel, the Tatsieta contains mudcracked, argillaceous, laminated, dolomitic lime mudstone and dololaminite intervals. In the Tatsieta, these beds tend to be dominantly limestone. The Tatsieta Formation also contains an abundance of waxy green shaly material within bed partings. Solitary, medium to thick beds of bright orange, silty to fine sandy dolostone occur in some Tatsieta sequences (e.g., in Section 19). Lime mudclasts and mudcracks are common. Lenses of imbricated lime mudclast breccias also occur in a few places, as in unit 11 of Section 27. As in the lower part of the Peel, bedding tends to be rather rhythmic. Intervals of medium bedded, grey, lime mudstone tend to grade upward to yellow and orange, argillaceous, mudcracked dololaminite in bedding hemicycles one to several metres thick.

In the subsurface, the Tatsieta, like the Peel, is an argillaceous or shaly unit with a very ragged gamma-ray log response in which individual log spikes, or responses, cannot be used as internal markers for regional correlations. Locally, such as between the Shell Tree River wells, individual log responses may be correlated.

Depositional setting. The Tatsieta Formation, like the Peel, records intertidal to supratidal deposition. The abundant mudcracks and bright yellow and orange coloration indicate subaerial exposure on intertidal to supratidal flats. Breccia beds of imbricated lime mudclasts are probably beach ridge deposits and also indicate multiple exposure surfaces. The absence of correlatable marker beds or horizons is consistent with a shoreface setting that was highly irregular and that underwent rapid and non-uniform trangressions and regressions across a very low-gradient sea-floor surface.

Mount Dewdney Formation (new formation)

Definition and age

The Mount Dewdney Formation is a new formation that includes strata previously included in the "Kutchin Formation" (Norris, 1985, 1997), or in the lowermost part of the Ogilvie Formation, as mapped by Norris (1981a) in the Porcupine River (116J, 116K (E1/2)) map area. The strata included in this formation are not mapped at a 1:250,000 scale at present, but they are recognizable as a distinct stratigraphic package of lowermost Devonian strata that overlies a significant unconformity in the region of the Dave Lord High (Norris, 1985). The Mount Dewdney Formation is named after Mount Dewdney, which is near the southern boundary of the Porcupine River map area, about 20 km east of its type section on Mount Burgess.

The Mount Dewdney Formation is a thin but distinctive unit several tens of metres thick, and is composed of yellow and orange, thin to medium bedded, silty dolostones. In outcrop, it forms a yellow band separating the thick grey Bouvette and Ogilvie formational sequences in the northwestern Ogilvie Mountains north of the Nahoni Range (Fig. 23). The type section for the Mount Dewdney comprises units 1, 2 and 3 of Section 56 (MTA-86-17). Unit 7 in Section 55 (MTA-86-16; Appendix 5) is an important nearby reference section. Both of these sections are located within 2 km of Mount Burgess.

Norris (1985) stated that strata included in the "Kutchin Formation", in general, are Lower Devonian. No age-specific faunas were collected by A.W. Norris from the "Kutchin Formation" at his Mount Burgess section (location 24 of Norris, 1985). Faunas collected from Mount Dewdney strata at Sections 55 and 56 of this study indicate a Middle Ordovician to Early Devonian (*inversus* Zone) age. Middle Ordovician to possibly Silurian faunas were collected only 4 m above the base of the Mount Dewdney Formation at Section 56. Well preserved *inversus* Zone conodonts (GSC locality number C-150906) of Early Devonian age (probable mid-Emsian) were collected from the top of the Mount Dewdney Formation at Section 55. The maximum possible age range for the Mount Dewdney Formation is Middle Ordovician to Early Devonian (Emsian).

The age of the base of the Mount Dewdney Formation cannot be determined with certainty from the data of this study. The Middle to Upper Ordovician (possibly Silurian) faunas found near the base of the Mount Dewdney have probably been reworked from uppermost beds of the

underlying Bouvette Formation. The Ordovician-aged conodont faunas collected from basal Mount Dewdney beds are highly fragmented and poorly preserved. These Ordovician conodonts were very likely reworked from the Bouvette during earliest Devonian erosion and redeposited within Mount Dewdney strata. If this is true, then the Mount Dewdney Formation is probably entirely Early Devonian and pre-middle Emsian in age.

Distribution, thickness and contact relations

Strata of the Mount Dewdney Formation are known from only two measured sections (Appendix 1) and three subsurface well sections (Appendix 4). This sparse control indicates that the Mount Dewdney is confined to the region of the Dave Lord High (Fig. 35). Within this area, the Mount Dewdney Formation exhibits rapid lateral variations in thickness. For example, in the two, closely spaced outcrop sections, 55 and 56, thicknesses are 40 and 81 m, respectively. Thicker sequences occur in the subsurface northeast of Mount Burgess where the Mount Dewdney is about 180 m thick in both the Western Minerals North Hope YT N-53 (Fig. 22) and the Peel Plateau Eagle Plains YT #1 N-49 wells.

The Mount Dewdney Formation is overlain conformably and gradationally by the Ogilvie Formation. The basal unit (unit 2 in Section 56) of the Ogilvie Formation at Mount Burgess contains orange, argillaceous bed partings and irregular bed partings that may be hardgrounds. These beds are lithologically transitional between the underlying Mount Dewdney Formation and the more typical, grey, limestones of the overlying Ogilvie Formation.

As discussed previously, faunal evidence indicates that Lower Devonian strata of the Mount Dewdney Formation unconformably overlie Middle to Upper Ordovician strata of the Bouvette Formation at Mount Burgess. The well developed, strongly silicified and very rusty weathering chert–pebble conglomerate, or breccia, that directly overlies Bouvette carbonates at Mount Burgess (Norris, 1985; Lenz, 1972; unit 1 in Section MTA-86-17) is direct physical evidence in favour of the existence of a sub-Mount Dewdney unconformity. In the subsurface, the base of the Mount Dewdney Formation is marked by a pronounced spike in both the gamma-ray and sonic logs (Fig. 22).

Lithology and internal markers

The Mount Dewdney Formation is mainly a yellowish orange weathering, thin bedded, silty and argillaceous dolostone. These beds have greyish green, irregular, argillaceous and commonly pyritic, bed partings in the lower part of the formation. Many of these irregular bed partings are probably hardgrounds. Bedding tends to be more planar with smooth bed partings toward the top of the Mount Dewdney. Fenestral fabric (Fig. 43), mudcracks (Fig. 44) and reworked mudflakes, occurring as solitary lithoclasts and as lenses of mudflakes, are common in the upper Mount Dewdney succession. Sand lenses and occasional dolomitic beds of fine grained sandstone occur. A few skeletal lime wackestone beds occur low in the formation. The base of the

Figure 3. *Tan coloured, fenestral dolomudstone with an admixture of orange silt and containing cemented hardgrounds and crusts, from the Mount Dewdney Formation in the Peel Plateau Eagle Plains YT #1 N-49 well (60 6 ft. or 1846.4 m below KB GSC Calgary photo 416 -9).*

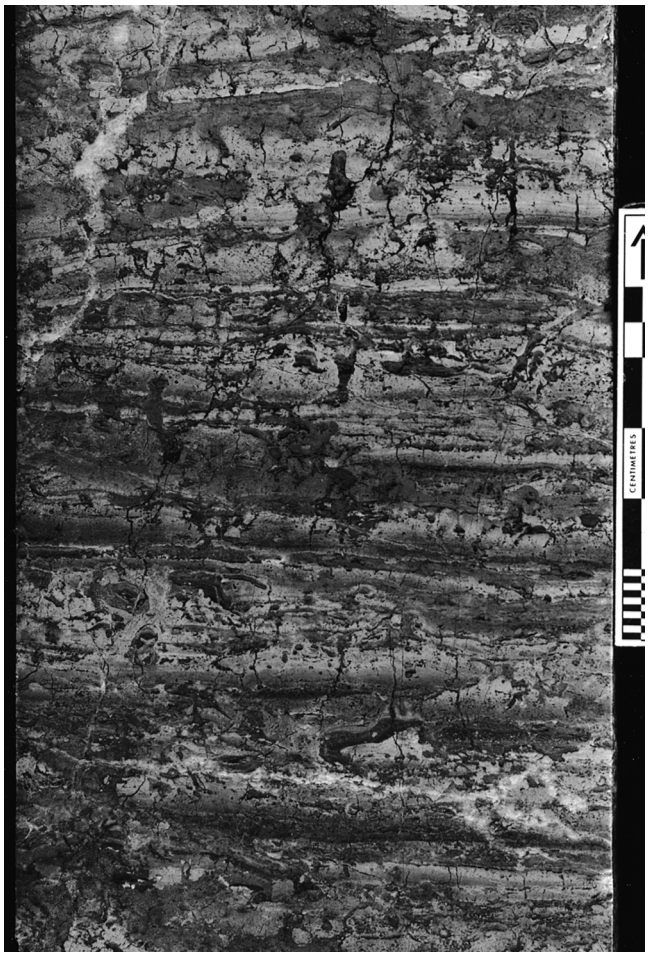


Figure . *Cream-coloured, intensely mudcracked dolomudstone from the Mount Dewdney Formation in the Peel Plateau Eagle Plains YT #1 N-49 well (6082. ft. or 18 4.4 m below KB GSC Calgary photo 416 -4).*

Mount Dewdney is marked locally by a prominent rusty band of silicified chert conglomerate that can be several metres thick. More commonly, this rusty basal band is thin or absent.

Too few well sections are available to attempt to correlate internal markers in the subsurface.

Depositional setting

The depositional setting of the Mount Dewdney Formation mirrors that of its counterpart, the Delorme Group of the Mackenzie–Peel Shelf. Like the Delorme Group, Mount Dewdney strata are dominated by intertidal and supratidal sediments. Mudcracks, mudflake-like lithoclasts and laminoid fenestral fabric indicate an intertidal to supratidal depositional setting. The orange silts and fine grained sands in the Mount Dewdney dolostones may have been reworked locally from subaerially exposed parts of the Dave Lord High in Late Silurian to earliest Devonian time. This implies that the Mount Dewdney Formation records progressive marine transgression onto the Dave Lord High. It seems likely that the rusty, siliceous, chert conglomerate bodies represent erosional concentrations of chert from the underlying Bouvette Formation that accumulated in shallow depressions or hollows on the eroded upper surface of the Bouvette during marine transgression.

The numerous irregular hardgrounds in the lower part of the Mount Dewdney succession may record many, brief periods of subaerial exposure. The highly irregular gamma-ray and sonic log character displayed by Mount Dewdney strata in the subsurface, may, like the subsurface Delorme Group, be a record of sporadic deposition of discontinuous, thin, silty clay seams during the landward advance of a highly irregular shoreline. The Mount Dewdney Formation may be regarded as a western depositional counterpart on the Yukon Stable Block of the Delorme Group on the Mackenzie–Peel Shelf, although the Mount Dewdney may also include strata younger than the Delorme Group.

Mount Dewdney Formation and the "Kutchin Formation"

Strata included in the Mount Dewdney Formation in this study were formerly included in the "Kutchin Formation" of Norris (1985). Use of the name "Kutchin Formation" is not continued in this report because, in order to render it useful as a stratigraphic unit, more than a minor revision is required in its definition. Under the Code, a formal stratigraphic unit may be abandoned if the unit was improperly defined and requires more than minor revision to render it viable (Article 20, in Oriel, 1983). On the other hand, a unit may continue to be used if only a minor revision is required to render it useful.

The "Kutchin Formation" was defined by Norris (1985, p. 7) as a succession of "dolomite and dolomitic limestone underlying limestone of the Ogilvie Formation and overlying a variety of carbonate and other rocks of Ordovician and Silurian age" (Fig. 4). The type section for the Kutchin Formation was chosen by A.W. Norris as units 3 and 4 of his Section 30 in the White Mountains (Norris, 1985). At the type section, A.W. Norris assigned 553 m of evenly thin- to thick-bedded, light grey to black, fine grained aphanitic dolomite, dolomitic limestone and dolomite to the "Kutchin".

At this section, "Kutchin" dolostones conformably overlie 218 m of bright orange and yellow weathering, silty and mudcracked dololaminites and lime mudstones that have

been mapped as Delorme equivalent by Norris (1981f). Morrow (1989) also noted that these brightly coloured strata were probably Delorme equivalent. Both Norris (1985) and Morrow (1989) noted that these strata, which Norris referred to as the Unnamed Carbonate Unit (Norris, 1985), rest with a pronounced erosional contact on the underlying clean, grey limestones of the Ordovician and Silurian Vunta Formation throughout the White Mountains. In this study, these Delorme-equivalent silty carbonates have been assigned to the Delorme Group and tentatively subdivided into the Peel and Tatsieta formations. Norris (1985) assigned a Late Silurian to earliest Devonian age to these strata, which is consistent with their assignment to the Delorme Group. The unconformity beneath these Delorme strata is interpreted here to be contemporaneous, if not continuous with, the sub-Devonian unconformity beneath the Delorme Group of the Mackenzie–Peel Shelf. This is a re-interpretation of Morrow (1989), who indicated that the sub-Devonian unconformity was beneath the "Kutchin", based on Pugh's (1983) placement of the sub-Devonian unconformity above the Peel, or, in other words, above the base of the Delorme.

The only other complete "Kutchin" section is at Section 24 of Norris (1985), at Mount Burgess. A.W. Norris noted that the lithologies of the "Kutchin" are atypical at this locality. These "Kutchin" strata have been re-assigned here to the Mount Dewdney Formation, mainly because they have been found to bear insufficient resemblance to the type "Kutchin" as defined by Norris (1985). Also, unlike "Kutchin" strata in the White Mountains type area, "Kutchin" strata in the vicinity of Mount Burgess are separated from underlying strata by a major unconformity. The Mount Dewdney Formation, which includes the "Kutchin" strata at Mount Burgess, forms a lithologically homogeneous stratigraphic unit recognizable in both surface and subsurface sections throughout the region of the Dave Lord High (Fig. 22, 35) and is, in fact, the western counterpart of the Delorme Group on the Yukon Stable Block.

This leaves the question of the status of the "Kutchin Formation" in the type area of the White Mountains. This question is left open although the name "Kutchin" is not used in this report in a formal sense. It should be noted that Norris (1985) described an informal member, entitled the dolomite beds, or dolomite member, within the Ogilvie Formation exposed between Blackstone and Hart rivers. The existence of these dolomite beds within Ogilvie strata south of Peel River has been confirmed and the dolomite member is recognized in this study as an informal member of the Ogilvie Formation. It is also evident that the Ogilvie dolomite member closely resembles strata of the type "Kutchin Formation", with respect to lithology, sedimentary features, age and stratigraphic position. It may be possible to extend the usage of the "Kutchin" from the White Mountains to include strata of the dolomite member. If this is done, the "Kutchin" should be redefined as a formal member of the Ogilvie Formation because it is not readily mappable at a 1:250,000 scale and is not present everywhere within the Ogilvie succession.

The continued use of the "Kutchin" as a formal stratigraphic unit is therefore deferred at this time. The contribution of this study is to recognize that the distinctive "Kutchin" strata at Mount Burgess should not have been included within the "Kutchin Formation", but warrant treatment as a separate stratigraphic unit, the Mount Dewdney Formation.

The Arnica to Hume succession: Mackenzie–Peel Shelf

Continuation of the marine transgression associated with the Kaskaskia Sequence eventually caused the marine inundation of the entire Mackenzie–Peel Shelf and the disappearance of local land areas. This led to deposition of shallow-water, subtidal, open-marine, clean carbonates of the Arnica and Landry formations across the entire shelf (Morrow and Geldsetzer, 1988). Landry deposition was followed in early Eifelian time by a brief, but widespread regression across the Mackenzie–Peel Shelf that led to the development of a slight unconformity, or disconformity, beneath the Hume Formation east of the study area, toward the town of Norman Wells and the Interior Plains (Fig. 5). This regression coincided with deposition of lower Eifelian basinal shales, the Mount Baird Formation, and farther south, the Funeral Formation shales on the distal, or basinward, edge of the Mackenzie–Peel Shelf during a period of reciprocal sedimentation (e.g., Meissner, 1972) that coincided with the exposure of a large part of western and northern Canada (Morrow and Geldsetzer, 1988, 1992).

This brief episode of post-Landry regression was followed in early to mid-Eifelian time by renewed and rapid marine transgression across the Mackenzie–Peel Shelf. No recognizable transgressive deposits accompanied this transgression. Instead, deposition of the Hume Formation occurred as a single overall progradational package of regressive sedimentation that infilled the depositional "accommodation space" at the end of transgression, or sea-level rise (Morrow and Geldsetzer, 1992).

The total thickness of the Arnica to Hume sequence within the study area averages a fairly constant 600 m (Fig. 45). The entire Arnica to Hume sequence passes abruptly westward into Road River shales in Richardson Trough and in Selwyn Basin.

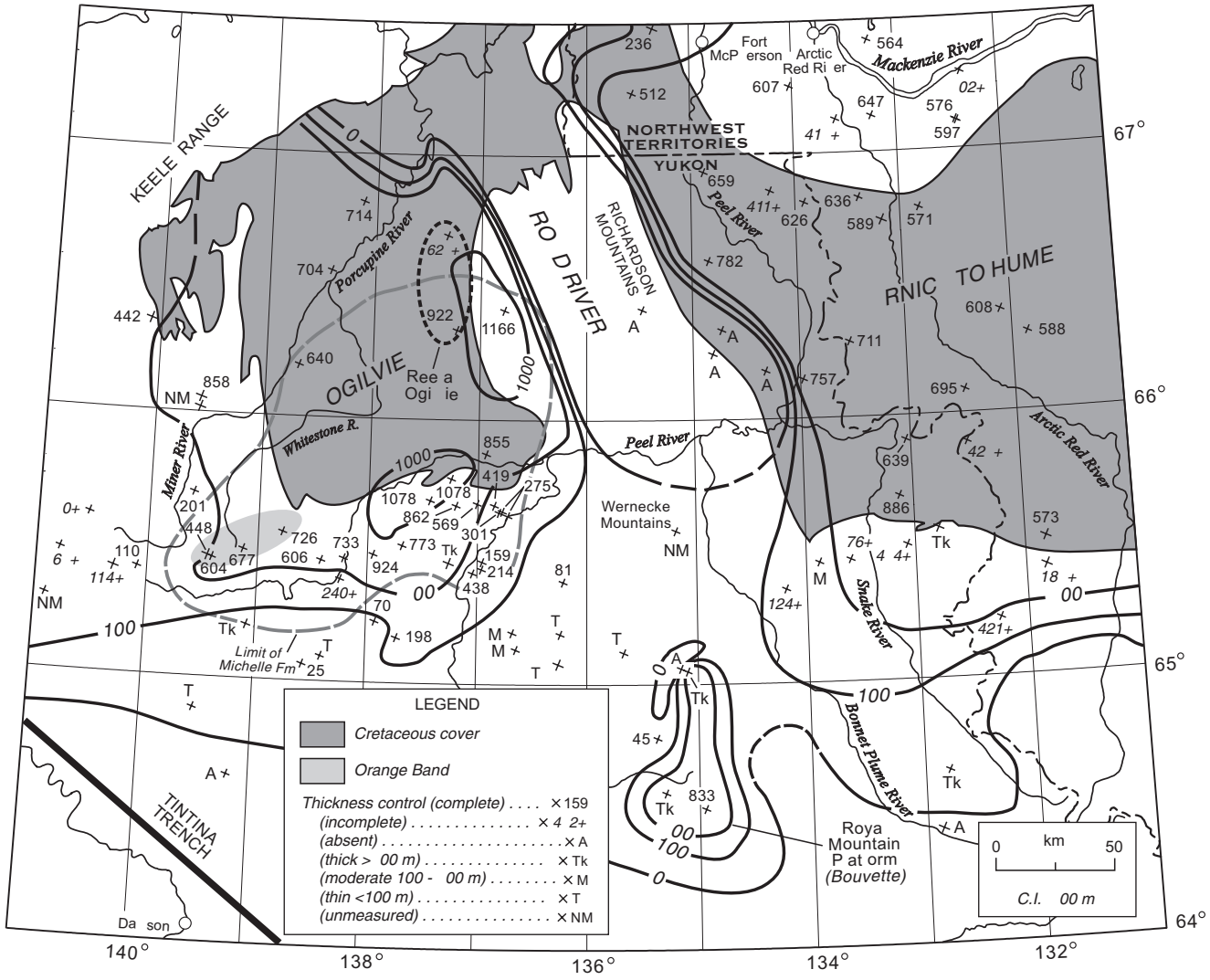


Figure 5. *Distribution and thickness of the Ogilvie Formation and its lateral equivalents, including carbonate strata within the Bouvette Formation (primarily within Royal Mountain Platform) across the Yukon Stable Block and the rnica, Landry and Hume formations east of Richardson Trough, across the Mackenzie–Peel Shelf. The main mass of the Ogilvie Formation northwest of Hart River has been termed the "Porcupine Platform" by Lenz (1972). The geometry of the Ogilvie to Road River transition in the subsurface of the northern part of Eagle Plain is from Chevron et al. (1972).*

Arnica and Landry formations and the "Cranswick Formation"

The Arnica and Landry formations are brownish grey and bluish grey weathering, 'clean', platform carbonate units that extend across the entire Mackenzie–Peel Shelf region (Fig. 3, 41). They contain virtually no siliciclastic material, in contrast to the underlying Delorme Group. The age, definition, and other attributes of these units in outcrop and in the subsurface have been described in previous publications (e.g., Douglas and Norris, 1961; Morrow, 1991; Morrow and Cook, 1987; Pugh, 1983; Pugh, 1993; Meijer-Drees, 1993). The data of this study are consistent with the descriptions of the Arnica and Landry formations in these previous studies. The few faunal determinations from outcrop sections of the Arnica and overlying Landry formations (Appendix 6) are consistent with the Early to Middle Devonian, Emsian to Eifelian, ages determined for these units in other studies (Morrow, 1991; Chatterton, 1978).

Complete sections of the Arnica Formation, ranging in thickness from 113 m to 376 m, were measured at three outcrop localities in the Mackenzie Mountains, along with one incomplete section. Typical Arnica dolostones, colour banded grey and greyish brown, are dominant in the more easterly outcrop sections, such as Section 27 (MTA-82-11). Colour bands reflect repetitive cycles of bedding in which

brown, locally fossiliferous (e.g., thamnoporids and crinoids (*Gasterocoma*? *bicaula*)), finely to medium crystalline, organic-rich, medium bedded dolostones grade upward to medium and light grey dololaminites.

More westerly sections tend to be limestone rather than dolostone and contain more open-marine colonial corals, particularly where the Arnica directly underlies basinal shales of the Road River and Mount Baird formations. At these shelf-edge sections, such as Section 41 (MTA-82-3), the dark limestones of basinal aspect, immediately beneath Mount Baird and/or Road River shales, have been assigned entirely to the Arnica Formation. The upper beds of these calcareous and thick Arnica shelf-edge sequences undoubtedly are time equivalent to the more typical, light coloured, shallow-water, pelletal Landry limestones above Arnica dolostones in more easterly sections. The assignment of the predominantly limestone strata above the Delorme and beneath either the Mount Baird and/or Road River or beneath the Hume Formation near the western shelf-edge follows the usage on 1:250,000 maps of this area (Norris, 1982d).

Norris (1968b) applied the name "Cranswick Formation" to these Arnica- and Landry-equivalent shelf-margin limestones. The "Cranswick Formation" contains abundant, open-marine coral, stromatoporoid, crinoid and conodont faunas that indicate an Emsian age (Norris, 1985; Pedder and Klapper, 1977). Use of the name "Cranswick Formation" is deferred in this report, largely because it has not been demonstrated to be a mappable unit on a 1:250,000 scale, and also because it is restricted to a relatively narrow strip adjacent to the basinward edge of the Mackenzie–Peel Shelf. In fact, Norris (1982d) cited the "Cranswick Formation" as an "obsolete" unit equivalent to the Arnica Formation. However, the name "Cranswick Formation" may ultimately satisfy a valid need to recognize these open-marine, shelf-margin limestones as a distinct shelf-margin facies, equivalent to both the Arnica and Landry formations. Morrow (1991) recognized a similar situation in the north-central part of the Mackenzie Mountains, where the Arnica–Landry dolostone–limestone package passes westward to an entirely limestone sequence near the shelf-edge margin adjacent to Selwyn Basin. Consequently, it is premature to regard the "Cranswick Formation" as obsolete. This name is not used here because too little is known concerning its outcrop and subsurface distribution, but the reader should be aware that there is a need to recognize these dominantly limestone strata near the shelf edge that are coeval with Arnica dolostones farther east.

Two outcrop sections of the Landry Formation were measured. At these localities, the Landry is a very resistant, 'rib-forming' bluish grey weathering unit in which intervals of thick bedded, tan, pelletal wackestone and packstone, which are several metres thick, alternate with thinner intervals of recessive, slightly argillaceous, dark grey lime mudstones. These typical Landry strata are developed east of the rather atypical, dominantly limestone Arnica Formation mapped along the northwestern edge of the Mackenzie Mountains in the Snake River (106F) map area. In areas where the Landry Formation is mapped, such as in the vicinity of Section 19 (Fig. 41), the underlying Arnica Formation is a medium to dark, greyish brown dolostone sequence, typical of the Arnica Formation elsewhere in the Mackenzie Mountains.

The Arnica and Landry formations occur in 23 subsurface well sections (Appendix 4). The combined thickness of these units is about 500 m and is remarkably uniform across the entire Mackenzie–Peel Shelf (Fig. 10). The 176 m of Landry Formation in the I.O.E. Stony I-50 well (Appendix 4) is a tongue of Landry limestone that extends basinward over Road River shales at the northeast edge of Richardson Trough.

The depositional setting of these units has been described by Pugh (1983, 1993) and by Morrow (1991), and summarized in Morrow and Geldsetzer (1992). In general, shallow-water subtidal to intertidal, quiet-water settings, typical for a broad shelf lagoon behind the Mackenzie–Peel Shelf margin (Wilson, 1975), characterized Arnica and Landry deposition. The relative absence of fauna in the Landry may indicate that this unit did not accumulate under normal marine conditions. Elevated salinity is one possible environmental stress that may have prevented the establishment of normal marine faunas during Landry deposition, but it is not evident why Arnica deposition was not similarly affected. Both the Arnica and Landry formations are basinward correlatives of the Bear Rock and Fort Norman evaporites (Pugh, 1993; Morrow, 1991; Meijer-Drees, 1993) and consequently deposition of both of these units must have been influenced by hypersaline marine brines generated farther east.

Mount Baird Formation

The Mount Baird Formation was defined recently by Norris (1985, p. 26; Fig. 4) as a unit of medium brown to buff weathering calcareous shale. This formation is exposed within a comparatively small region in the Snake River (106F) map area, where it was mapped as the DSH map unit (Norris, 1982d) overlying the Arnica Formation (or overlying a thin Road River tongue, which, in turn, overlies Arnica carbonates) and underlying the Hume Formation and the Canol Formation (as part of the DI1 map unit of Norris, 1982d). The type section of this formation at Section 6 of Norris (1985) is also included here in Section 32 (MTA-82-8, Appendix 5). Norris (1985) reported 595 m of Mount Baird strata at the type section. The remeasurement of the type section of this study assigned only 326 m of strata to the

Mount Baird Formation. Similarly, the underlying Road River tongue was assigned only 90 m of strata, whereas Norris (1985, p. 79) reported 119 metres of Road River strata beneath the Mount Baird Formation at its type section.

There may be two explanations for these thickness differences. First, soft shale sections are subject to being measured greater than their true thicknesses because of the constant downslope movement of the measurer. Second, there is some question concerning the exact location of the original type section. The reason for this is that Norris (1985, p. 79) reported that the Mount Baird Formation at the type section is overlain by Canol Formation. This does not correspond with the stratigraphy of Section 32, which coincides in location with Section 11b on the geological map of the Snake River (106F) map area (Norris, 1982d), and in which the Mount Baird Formation is clearly overlain by Hume Formation. This raises the possibility that the type section of A.W. Norris (1985) was measured one or two kilometres west of Section 32 (MTA-82-8), where Mount Baird strata are slightly thicker and directly overlain by the Canol Formation. This is considered unlikely because exposures are poor west of Section 32.

Another alternative is that Norris (1985) may have included all strata now mapped as Hume Formation within his Mount Baird type section. Examination of the stratigraphic cross-section shown in figure 4 of Norris (1985) indicates that this is the probable explanation for this discrepancy in measured thicknesses. Clearly, Norris (1985) chose to include beds equivalent to the Hume Formation in the upper part of the Mount Baird Formation. The thickness of the Mount Baird Formation of Norris (1985) is almost identical to that measured in this study if the uppermost limestone beds are removed from the total thickness of the Mount Baird Formation at the type section.

The use of the Mount Baird as a formal stratigraphic unit is reaffirmed in this study (Fig. 5). It is, however, slightly modified to exclude the uppermost, bluish grey, fossiliferous limestones of the Hume Formation, in accordance with the existing 1:250,000 geological map (Norris, 1982d).

Only two sections of the Mount Baird Formation, including its type section, were measured in this study (Appendix 5). The Mount Baird succession is remarkable in that it rapidly increases in thickness westward from a feather edge between the Hume and Arnica formations at the western limit of mapped Landry Formation, in the centre of the Snake River (106F) map area, to a maximum thickness of about 500 m at the western edge of the map area. West of this map area, the Mount Baird Formation has not been identified and it probably merges with the Road River Group of Richardson Trough, as suggested by Norris (1985).

At the type section, the Mount Baird Formation is composed of greyish yellow weathering, laminated, calcareous shale and light green to orangish yellow weathering thin bedded, argillaceous and dolomitic lime mudstones that are sporadically slightly fossiliferous. The lowermost 30 m contain crinoidal wackestones, but higher beds contain few obvious fossils except for the remains of some pelagic faunas, such as orthoconic cephalopods. Sedimentary features are all consistent with a basinal depositional setting below effective wave base. Hemipelagic deposition dominated, but occasional beds displaying crossbedding may indicate that the sea floor was above storm wave-base. Crudely graded, thin to medium beds of crinoidal wackestone near the base of the formation may indicate deposition on a basin slope adjacent to the margin of the Mackenzie–Peel Shelf.

The age of the Mount Baird Formation is Eifelian (Norris, 1985). It is probably early Eifelian because it conformably underlies Hume Formation strata that are of mid- to late Eifelian age, and it overlies Arnica strata of late Emsian age.

Hume Formation

The Hume Formation is the uppermost carbonate unit of the Arnica to Hume succession of the Mackenzie–Peel Shelf. It was described initially by Bassett (1961) as a sequence of fossiliferous and argillaceous, Middle Devonian limestones overlying the Bear Rock Formation and underlying the Hare Indian Formation in the northern Franklin Mountains and eastern Mackenzie Mountains. The Hume is very extensive laterally, and, in the western Mackenzie Mountains and in the subsurface of the Peel and Anderson plains, the Hume overlies the Landry Formation and underlies the Canol Formation (Fig. 5). The Landry is the lateral equivalent of the upper part of the Bear Rock Formation (Morrow, 1991). The upper and lower Hume contacts are sharp, but conformable in the study area. Farther southeast, toward the Hume type area, the lower contact becomes disconformable (Bassett, 1961). Farther south and east, this possible disconformity merges with the sub-Headless and mid-Chinchaga unconformity (Morrow and Geldsetzer, 1988; 1992)

Because of its great geographic extent in both subsurface and outcrop, and because of its stratigraphic position at the top of the Lower to Middle Devonian succession of platform carbonates across the entire Mackenzie–Peel Shelf sequence, the Hume Formation has proven to be an effective regional marker with its easily recognizable upper and lower contacts (Norris, 1985; Pugh, 1983, 1993). The effectiveness of the Hume Formation as an easily recognized and correlatable marker unit has been greatly enhanced by the

numerous and detailed paleontological and biostratigraphic studies of its prolific and diverse faunas. An excellent description of these paleontological studies and their biostratigraphic significance is given in Norris (1985). Taken together, these studies indicate that the Hume Formation ranges from lower Eifelian (*costatus* Zone) to uppermost Eifelian (*ensensis* Zone), with uppermost beds possibly including lowermost Givetian strata (Chatterton, 1978). Faunas from the top of the Hume, and its southern correlative, the Nahanni Formation, are nearly identical, indicating that the upper contact of both of these formations was a nearly synchronous depositional surface at the end of Hume–Nahanni deposition (Chatterton, 1978).

Hume Formation limestones are extensively exposed in outcrop belts along the northern Mackenzie Mountains (Norris, 1982d; Aitken et al., 1982). Only two, incomplete, Hume sections were measured, both from the Snake River (106F) map area (Appendices 1, 5). The Hume Formation in these sections is composed of a recessive, greenish and yellowish grey weathering, thin to medium bedded, argillaceous and shaly, skeletal, or fossiliferous lime wackestone in the lower part, grading upward to a cliff-forming, thick bedded, less argillaceous, grey and bluish grey weathering, coralline lime wackestone. In the western part of the Snake River (106F) map area, the upper, resistant, cliff-forming part of the Hume is poorly developed and disappears westward. The Hume itself thin and disappears where it overlies shales of the Mount Baird Formation and merges with Road River shales in the Richardson Anticlinorium.

In the southeast corner of the Snake River (106F) map area, the Hume Formation is estimated to be 100–200 m thick. The total Hume thickness was not measured here, but at Section 19 it is clearly in excess of 100 m, or about one-half to two-thirds the thickness of the underlying Landry Formation, or significantly thicker than the Hume exposed in the west-central part of the Snake River (106F) map area (Fig. 41; Appendix 1).

These thickness trends are consistent with the regional north to northwestward thinning of the Hume Formation in the Mackenzie Mountains documented by Tassonyi (1969) and Morrow (1991). Northward thinning of the Hume is clear also in the subsurface of the Peel and Anderson plains (Fig 10). In the subsurface, the upward shoaling aspect of the Hume is well shown on gamma-ray logs, where the very argillaceous and radioactive base of the Hume grades upward to less radioactive carbonates typical of the upper Hume. This is particularly true of the thicker Hume sequences in more southerly wells, such as Amoco PCP A-1 Cranswick A-22 and Inexco et al. Weldon Creek O-65 (Fig. 10). Farther north, such as at the Shell Arctic Red West G-55 and Shell Tree River east H-57 wells, the thinner Hume sequences lack the less radioactive, less argillaceous upper member of the Hume (Fig. 10).

This northward disappearance of the upper Hume beds could indicate that the north and northwestward limit of these upper beds may coincide with their original seaward, or basinward, depositional limit. This presupposes that the Hume Formation was a progadational wedge of highstand carbonate platform deposits in which the argillaceous lower Hume represents the gentle submarine slope, or subtidal carbonate apron deposits that accumulated seaward of a progradational carbonate shelf. This style of regressive sedimentation was also described by Noble and Ferguson (1971) for the correlative Headless–Nahanni sequence of the southern Mackenzie Mountains.

Deposition of the upper Middle Devonian and Upper Devonian radioactive siliceous black shale of the Canol Formation above the Hume marked the end of lower Paleozoic shelf carbonate deposition on the Mackenzie–Peel Shelf.

Michelle to Ogilvie succession - Yukon Stable Block

Contemporaneous with deposition of the Arnica to Hume succession on Mackenzie–Peel Shelf, the Michelle to Ogilvie succession accumulated across the central part of the Yukon Stable Block (Fig. 34, 45). As previously discussed, the use of the lower Paleozoic stratigraphic nomenclature of the Mackenzie–Peel Shelf sequence in the region of the Yukon Stable Block (e.g., Pugh, 1983) obscures the real and fundamental differences that exist between the stratigraphy of these areas. Perhaps the greatest difference in styles of sedimentation between these regions is seen in Lower Devonian strata.

During earliest Devonian time, the entire Mackenzie–Peel Shelf was either exposed or the site of Delorme Group deposition. Contemporaneous with Delorme accumulation, deposition of basinal Road River shales occurred across most of the Yukon Stable Block (Fig. 38). Only along the Dave Lord High, on the west side of the Yukon Stable Block, was there subaerial exposure at some undetermined time within the Late Ordovician to earliest Devonian. Shale deposition persisted throughout most of Early Devonian time in the Blackstone Trough area of the Yukon Stable Block, except in those areas of isolated carbonate buildups, or platforms, such as the Royal Mountain Platform (Fig. 34). In earliest Emsian time, Road River basinal shale deposition gave way to deposition of the basin and slope-deposited calcareous shales and argillaceous limestones of the Michelle Formation, north and west of Blackstone and Richardson troughs (Fig. 34). By middle Emsian time, shallow-water platform carbonate deposition of the Ogilvie

Formation had spread across the areas of former Michelle deposition (Fig. 45). The area occupied by the Ogilvie Formation has been termed the "Porcupine Platform" and was identified as a Devonian paleogeographic entity by some authors (e.g., Morrow and Geldsetzer, 1988). In this study, the more fundamental, longer lived, paleogeographic and tectonic entity embracing the "Porcupine Platform" is the Yukon Stable Block, which is used preferentially because of its applicability to the entire lower Paleozoic succession.

The Michelle to Ogilvie succession bears little resemblance to the Arnica to Hume succession east of Richardson Trough (Fig. 5). The basin and slope deposits of the Michelle Formation are totally unlike any of the shallow-water carbonates of the Arnica to Hume succession. Pugh (1983) attempted to extend the Tatsieta Formation westward to embrace Michelle strata. This is clearly inappropriate because Tatsieta strata east of Richardson Trough are entirely peritidal. Pugh (1983) also attempted to extend the Landry and Arnica formations westward across Richardson Trough. This too is inappropriate because dolomitized strata within the lower part of the Ogilvie Formation are discontinuous and not readily mappable as a westward extension of the Arnica Formation. In addition, the Hume Formation could not be recognized west of Richardson Trough (see also Pugh, 1983). The absence of the Hume across the Yukon Stable Block is also an indication that the Landry Formation should not be extended westward either. Use of the Michelle and Ogilvie formations, as suggested by Norris (1985), in preference to the Arnica, Landry and Hume formations, for the region of the Yukon Stable Block, is reaffirmed in this study.

Michelle Formation

Definition and age. The Michelle Formation was defined by Norris (1968b, p. 16; Fig. 4) as an argillaceous and shaly limestone unit that overlies graptolitic shales of the Road River Formation and abruptly underlies the clean carbonates of the Ogilvie Formation. As described clearly by Norris (1985), the Michelle represents the upward transition from basinal shale of the underlying Road River Formation to the relatively shallow-water carbonates of the Ogilvie Formation. Subsequently, the Michelle Formation has been used as a viable map unit in a number of 1:250,000-scale geological maps (e.g., Norris, 1982a, b, c). It is typically exposed as a thin band of medium to light greyish brown strata separating underlying, more recessive weathering Road River strata from overlying resistant and light coloured Ogilvie carbonates (Fig. 46).

The type section is at Section 14 of Norris (1985) located about 1.6 km west of Hart River. At this locality, Norris (1985) assigned 167.6 m to the Michelle Formation. Section 48 (MTA-84-3) of this study (Appendix 5) also contains the type section of the Michelle Formation, which here has been assigned a thickness of 223.5 m. Norris (1968b, 1985) probably included only the argillaceous limestone unit 2 in

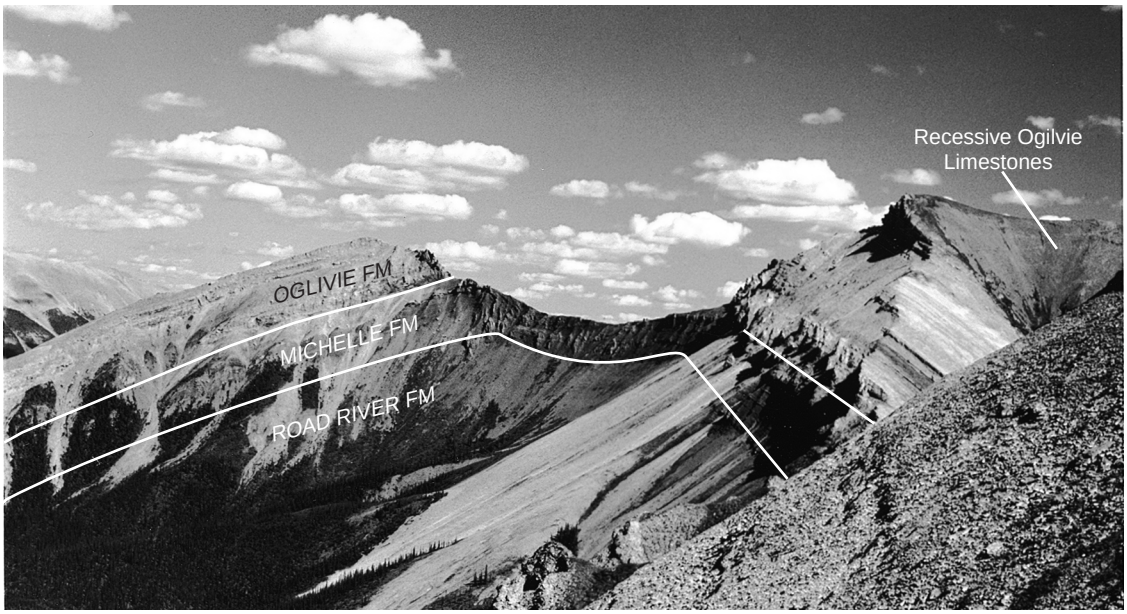


Figure 46. *View of the Road River–Michelle–Ogilvie sequence east of Section 29 (MTA-84-9) in the Hart River map area (116H). Note the recessive, darker grey, thin bedded, basinal limestones at the top of the Ogilvie Formation, exposed along the south side (GSC Calgary photo 4298-17).*

Section 48 within the Michelle Formation, whereas in this study units 3 and 4 have also been assigned. This was done because these upper units contain a large admixture of argillaceous material and display sedimentary features indicative of submarine-slope deposition. They are clearly distinct from the overlying, clean, shallow-water carbonates of the Ogilvie Formation.

The Michelle Formation is notable for its prolific and diverse, mixed benthonic and pelagic fauna, including brachiopods, trilobites, conodonts, tentaculitids, crinoids, gastropods, ostracodes, nautiloids, corals, pelecypods, bryozoa, algae, and fish remains. A complete summary, with lists of important fauna, is given in Norris (1985). He concluded that the fauna are part of the upper Pragian stage and the lower part of the Emsian stage of the Lower Devonian, including the conodont *dehiscens* Zone (Fåhraeus, 1971; Ludvigsen, 1972). These biostratigraphic determinations are confirmed by the large number of faunal identifications of Michelle fauna contained in this report (Appendix 6).

Distribution, thickness and contact relations. The Michelle Formation is confined to the western and central parts of the Yukon Stable Block, east of Porcupine River (Fig. 34). The SOBC Blackstone River YT D-77 is located approximately at the geographic centre of its distribution. The Michelle Formation was not found to extend east of the confluence of the Peel and Hart rivers (Fig. 34). The northern limit of the Michelle is only approximate because of the sparseness of well control in Eagle Plain. It does not extend into the Blackstone Trough region (Fig. 34) and is absent in all areas where the overlying Ogilvie is less than 100 m thick (Fig. 45).

Fifteen complete and two incomplete outcrop sections of the Michelle Formation were measured, with thicknesses commonly between 100 and 200 m (Appendix 1). Three wells in Eagle Plain contain complete Michelle sequences ranging in thickness from 62 to 289 m (Appendix 4).

Both the upper and lower contacts of the Michelle Formation are conformable and transitional. The lower contact of the brownish grey argillaceous limestones of the Michelle is transitional to underlying, darker colored Road River shales; consequently choice of a contact is arbitrary at many outcrop locations. Where slopes are steep, the Road River–Michelle contact tends to be talus covered (Fig. 46). On gentler slopes this contact tends to be covered by alpine vegetation. These features probably result in some underestimation of thicknesses by several tens of metres at some sections, perhaps explaining, in part, the rather thick Michelle at the type section, where the lower contact is well exposed. However, most of the thickness variations recorded in this study must have a sedimentological explanation. There is, perhaps, a tendency for thicker Michelle sequences to occur in some areas underlain by thicker Road River sequences (Fig. 9, 22). In the subsurface, the Michelle–Road River contact tends to be fairly well defined, where the gamma-ray log abruptly increases and sonic log transit time increases and becomes more uniform downhole (Fig. 21, 22). The upper contact of the Michelle is also transitional but readily identified. In outcrop the contact is with resistant, light coloured Ogilvie carbonates, and in the subsurface there is a gradual upward transition to the low, uniform gamma-ray log and high acoustic transit times characteristic of the overlying Ogilvie (Fig. 46, 22).

Lithology and internal markers. The type section is very representative of the range of lithologies and sedimentary features exhibited by the Michelle Formation. The recessive lower part tends to weather a uniform brown and is exposed as scattered small cliffs of argillaceous, rhythmically thin to thick bedded, fossiliferous lime mudstone and skeletal wackestone that contain abundant brachiopod, trilobite and ostracode fragments. Solitary, resedimented, overturned colonial corals and stromatoporoids occur sporadically in these lower beds. Above these beds, the Michelle tends to be more resistant because the argillaceous fossiliferous lime mudstones are interbedded with thick to very thick beds of rubble floatbreccia. In the breccias, grey angular clasts of crinoidal lime wackestone and packstone (encrinite) are suspended in a matrix of brown argillaceous lime mudstone (Fig. 47, 48). These thick breccia beds become more abundant toward the top of the formation, and many of the uppermost beds tend to be mosaic and even crackle breccias, rather than the more chaotic rubble breccias observed lower in the Michelle. Large scour-fill beds and poorly developed

Figure 7. *Sedimentary rubble packbreccia and floatbreccia at the top of the Michelle Formation, immediately below the Michelle–Ogilvie contact in Section 48 (MT -84- , unit 4). Darker clasts are fossiliferous skeletal and crinoidal lime mudstones. Lighter brownish grey matrix is argillaceous and fossiliferous lime mudstone and calcareous mudstone (GSC Calgary photo 4298-16).*

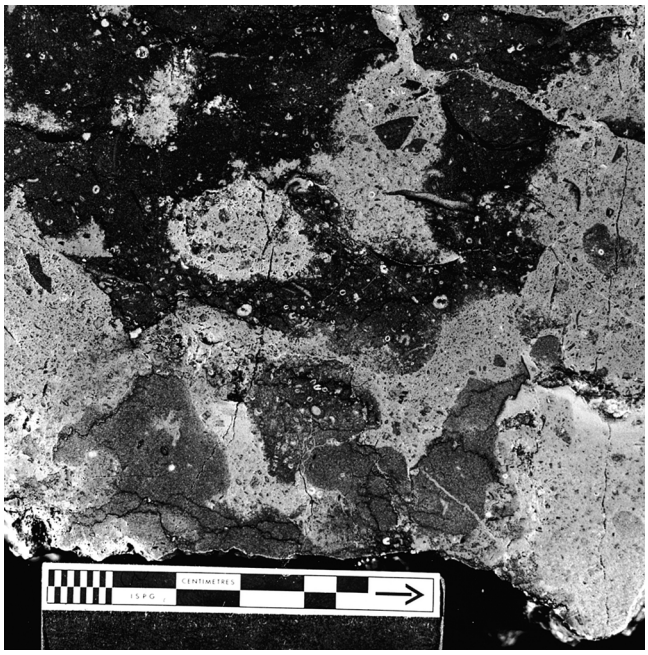


Figure 8. *Silty, mottled limestone breccia in the Michelle Formation, just below the upper contact of the Michelle with the overlying Ogilvie Formation in Section 4 (MT -84-10 m above section base). Darker grey clasts of crinoidal wackestone are encased in a lighter grey, silty, fossiliferous lime mudstone matrix (GSC Calgary photo 416 -21).*

crossbedding are common toward the top of the formation (Fig. 49) and nodular bedding occurs near the top at some sections.

Internal markers could not be identified in outcrop. It may be possible to trace and interpret log markers within the Michelle but the dearth of subsurface well sections precludes this at present.

Depositional setting. There can be little doubt that the Michelle Formation was deposited in a submarine slope setting, largely below effective wave base. There is no indication of reworking by wave-generated currents in the uniformly and planar-bedded lower part of the Michelle. However, the presence of crossbedding and scour and fill sedimentary structures in the upper part of the formation indicates a shallower subtidal setting within the depth of normal wave base.

The thick rubble breccia beds in the upper part of the Michelle probably represent submarine debris flows initiated by seismic or storm activity on submarine slopes (McIlreath and James, 1984). The crackle and mosaic breccias common near the top of the formation resemble the "internal carbonate breccias" described by Fuchtbauer and Richter (1983) that form in-place immediately basinward of carbonate shelf margins. In breccias of this type, the host sediment is sucked into interfragment spaces because of the dilation of partly lithified limestones that occurs during in

Figure 9. *Submarine scour-fillings in the upper part of the Michelle Formation of Section 48 (MT -84- , unit 4) in the Hart River map area (116H). These beds are mainly argillaceous and silty fossiliferous lime mudstone and may have formed in a submarine slope environment basinward from a shelf margin (GSC Calgary photo 4298-1).*

situ brecciation, to form oligomictic crackle breccias. Fuchtbauer and Richter (1983) suggested that these crackle breccias provide a ready source of carbonate fragments that can be remobilized as downslope mass-flow deposits of rubble breccia. Nodular bedding is also a feature of some carbonate shelf-margin slope settings, particularly carbonate ramp settings without clearly defined shelf margins (Read, 1985).

Fuchtbauer and Richter (1983) described a process of tectonically induced flexuring that occurs during the lateral migration of geosynclinal shelf margins to form internal crackle breccias. However, the Michelle Formation was not deposited in this type of setting. Crackle breccias probably formed in the Michelle because partly lithified masses of crinoid wackestone in the upper part of the formation rested directly on unstable, water-saturated muds on a gentle submarine ramp. Violent storms and seismic disturbances probably provided sufficient energy to form dilational crackle breccias out of these submarine crinoidal limestone shoals and to subsequently mobilize them downslope as subaqueous debris flows.

The general absence of large-scale scour and fill structures and the absence of large debris flows low in the Michelle indicate that the depositional slope was low angle, probably only a few degrees.

Ogilvie Formation

Definition and age. The Ogilvie Formation was introduced by Norris (1968b) for a sequence of Devonian carbonates "overlying the Michelle and Gossage Formations and underlying the Hare Indian Formation and....unnamed shales". The Ogilvie Formation overlies the Michelle and Mount Dewdney formations and underlies shales mapped as the Canol Formation (Norris, 1985a), except for a small part of the southwest corner of the Ogilvie River map area, where it is overlain by the McCann Hill Chert (Fig. 5; Norris, 1985a). A.W. Norris (1985) referred to the strata mapped as Canol Formation by D.K. Norris (1985a) as an 'unnamed shale unit', slightly older than the Canol Formation at its type section at Norman Wells (Bassett, 1961) and argued that a name other than Canol Formation should be applied to these strata. It is noted here that the Canol Formation, as mapped across northern Yukon Territory (Norris, 1985a), may bear a slightly closer lithostratigraphic and biostratigraphic resemblance to the McCann Hill Chert than it does to the Canol Formation east of the Richardson Anticlinorium. There can be little doubt, however, that the Canol Formation mapped in northern Yukon Territory is lithostratigraphically continuous with the Canol Formation east of the Richardson Anticlinorium (e.g., Fig. 19).

The data of this study are insufficient for the purpose of deciding whether or not the Canol Formation is the most appropriate name for the shale sequence immediately overlying the Ogilvie Formation. Consequently, the name 'Canol Formation' is used here on a provisional basis.

The Ogilvie Formation forms a readily mappable, 100 to 500 m thick unit throughout most of the Wernecke and Ogilvie mountains, south and west of Eagle Plain (Fig. 45). In areas where it is underlain by a Road River to Michelle sequence, it forms linear ridges or bald, unvegetated, light grey hills separated from the more massive mountain-forming, very thick, darker grey Bouvette carbonates by valleys underlain by recessive, vegetated Road River and Michelle strata (Fig. 25). In areas where the Ogilvie is underlain by the thin Mount Dewdney Formation and the Bouvette Formation, the Ogilvie–Mount Dewdney sequence tends to form a separate ridge line on the flanks of broader hills formed of Bouvette strata (Fig. 23).

The type section consists of 667.5 m of variably fossiliferous, light to medium grey limestone at Mount Burgess near the southern boundary of the Porcupine River map area (116J and 116K, E1/2) (Norris, 1968b; 1985). Section 56 (MTA-86-17) of this study includes the original Ogilvie type section. Here, 858 m of well exposed, variably fossiliferous limestone were assigned to the Ogilvie Formation, overlying silty dolostones of the Mount Dewdney Formation and underlying rusty weathering, siliceous black shales of the Canol Formation. This difference in measured thicknesses of the Ogilvie at its type section, may, in part, be due to the fact that Norris (1985) assigned a greater thickness of strata to his "Kutchin Formation" beneath the Ogilvie than are assigned to the Mount Dewdney Formation of this study.

The Ogilvie Formation is predominantly a medium to thick bedded, fossiliferous limestone sequence and was described by Norris (1968b) as a "medium brown to grey, fine grained, thin bedded to massive, resistant, cliff-forming limestone, generally weathering light to medium grey". At many localities, the lower part of the Ogilvie Formation is primarily dolostone, rather than limestone. These dolostone strata have been informally termed the "dolomite beds" by Norris (1985), in the region of the Hart and Blackstone rivers. These beds are referred to here as the 'dolomite member', an informal subdivision of the Ogilvie Formation, in order to emphasize that they are locally mappable (Fig. 50).

Fauna in the lower, commonly dolomitic, Ogilvie beds are dominated by amphiporids (Fig. 51) and some thickets of ramose 'stick' corals. Crinoids are common throughout and are particularly abundant in the lowermost beds,

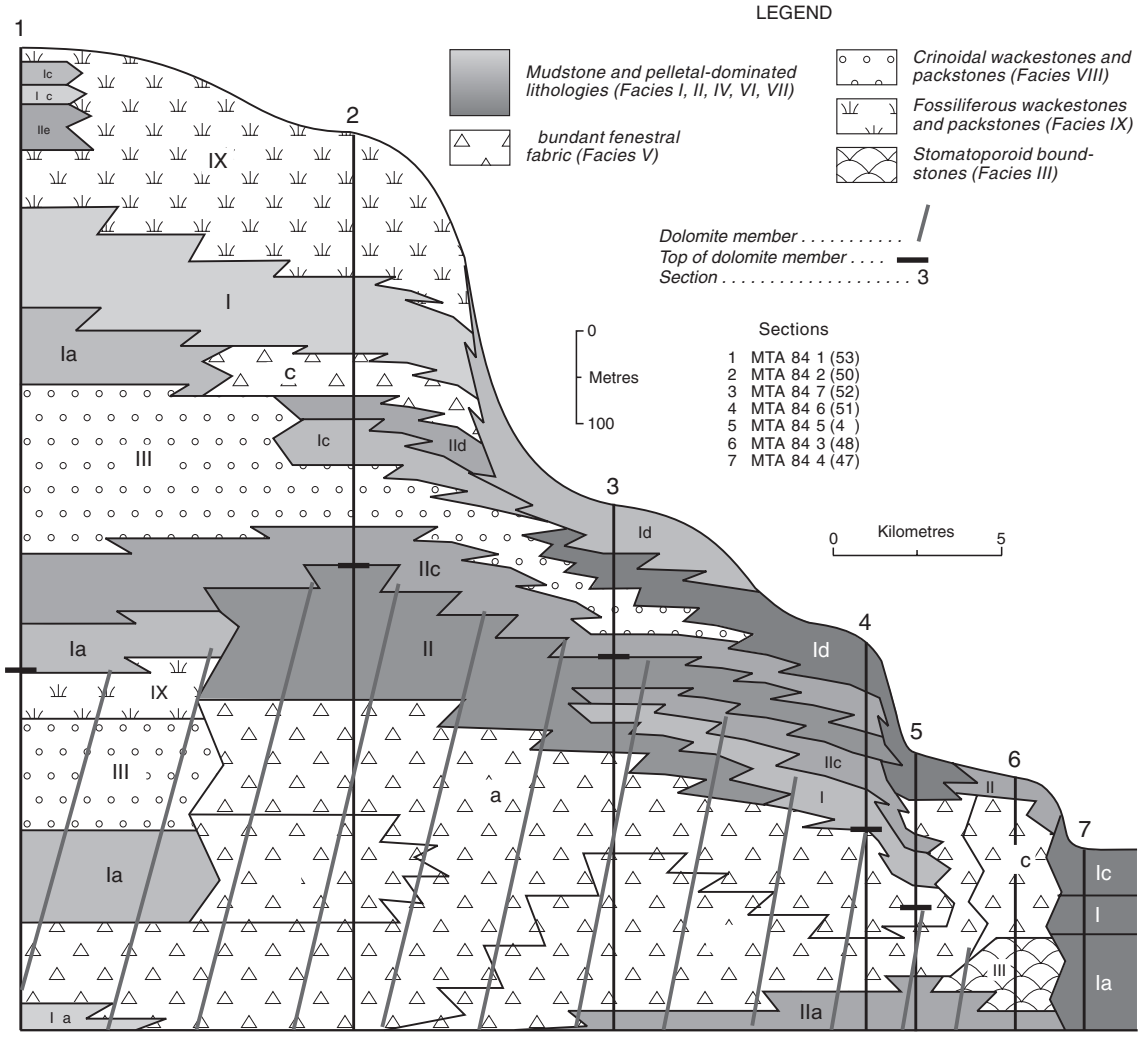


Figure 50. *Distribution of lithofacies within the Ogilvie Formation along an east–west line of section between Blackstone and Hart rivers at the mountain front bordering the southern edge of Eagle Plain. The Ogilvie Formation thickens rapidly westward towards the centre of Porcupine Platform on the Yukon Stable Block. The Michelle–Ogilvie contact is the datum for this cross-section.*

immediately above the Michelle Formation, and also in the upper Ogilvie (Fig. 52). Large hemispheroidal and platy stromatoporoids (Fig. 52, 53) and colonial corals are common to abundant in the upper part of the Ogilvie, particularly in thicker Ogilvie sequences.

Paleontological evidence indicates an Emsian to latest Eifelian age for the Ogilvie Formation at most localities (Norris, 1985; Perry et al., 1974). This is in accord with ages assigned to the extensive conodont collections obtained in this study from Ogilvie strata (Fig. 54; Appendix 6). At Mount Burgess, Norris (1985) reported the occurrence of stringocephalid brachiopods, a guide fossil indicating Givetian strata, in the uppermost several hundred metres of the Ogilvie Formation. Well preserved stringocephalids were also observed in the top 20 m of the Ogilvie in Section MTA-86-17. Givetian Stage conodonts (Perry et al., 1974) and corals (Pedder in Norris, 1985) also have been identified in the uppermost 300 m of strata in the type section. Consequently the total age range of the Ogilvie Formation is early Emsian (*gronbergi* Zone) to early Givetian (*varcus* Zone), within the Early to Middle Devonian.

Distribution, thickness and contact relations. Complete Ogilvie sections were measured at 27 localities, as well as an additional six incomplete sections (Appendix 1). In the subsurface, complete Ogilvie sequences were penetrated in nine wells (Appendix 4).

The Ogilvie Formation extends across almost the entire Yukon Stable Block. However, it is lithologically atypical and very thin to absent in Blackstone Trough, southeast of Hart River (Fig. 9, 45). The main area of Ogilvie development lies north and west of Hart River, where it is

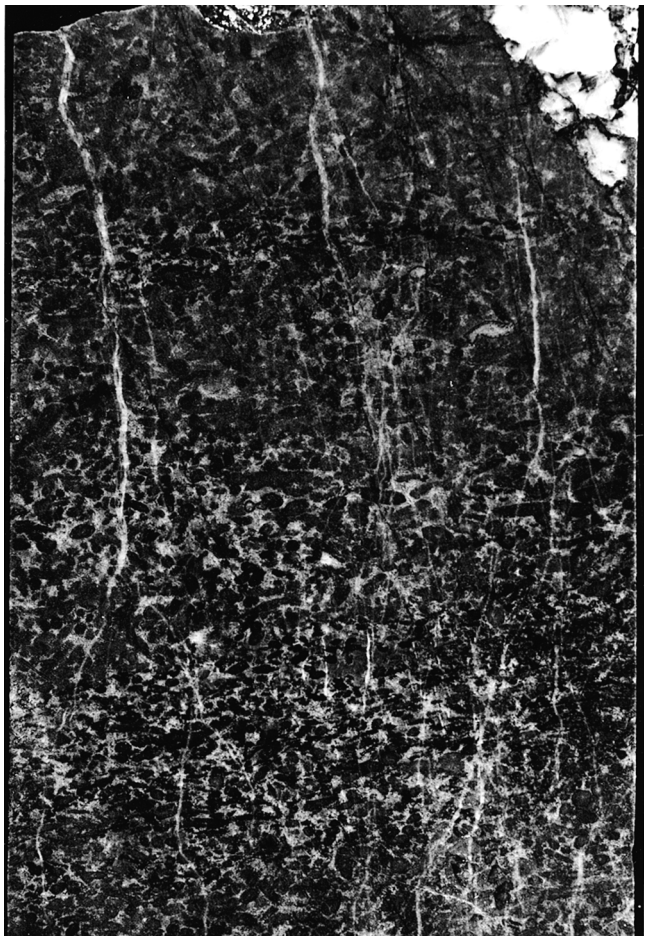


Figure 51. *mphiporid packstone and wackestone in the upper part of the dolomite member of the Ogilvie Formation in the Peel Plateau Eagle Plains YT #1 N-49 well (91. ft. or 1704.7 m below KB GSC Calgary photo 416 -8).*

generally between 500 and 1000 m thick (Fig. 45). There are two regions where the Ogilvie is particularly thick. One region trends east-northeast along the Peel River and includes the anomalously thick Ogilvie in Section 53 (MTA-84-1) and in the SOBC Blackstone YT D-77 well. The other region trends north-northwest near and subparallel to the west side of Richardson Trough. This latter region is poorly defined and includes only one Ogilvie sequence greater than 1000 m in the Socony Mobil-WM South Tuttle YT N-05 well.

Figure 5 . *mphiporid packstone and wackestone in the upper part of the dolomite member of the Ogilvie Formation in the Peel Plateau Eagle Plains YT #1 N-49 well (91. ft. or 1704.7 m below KB GSC Calgary photo 416 -8).*

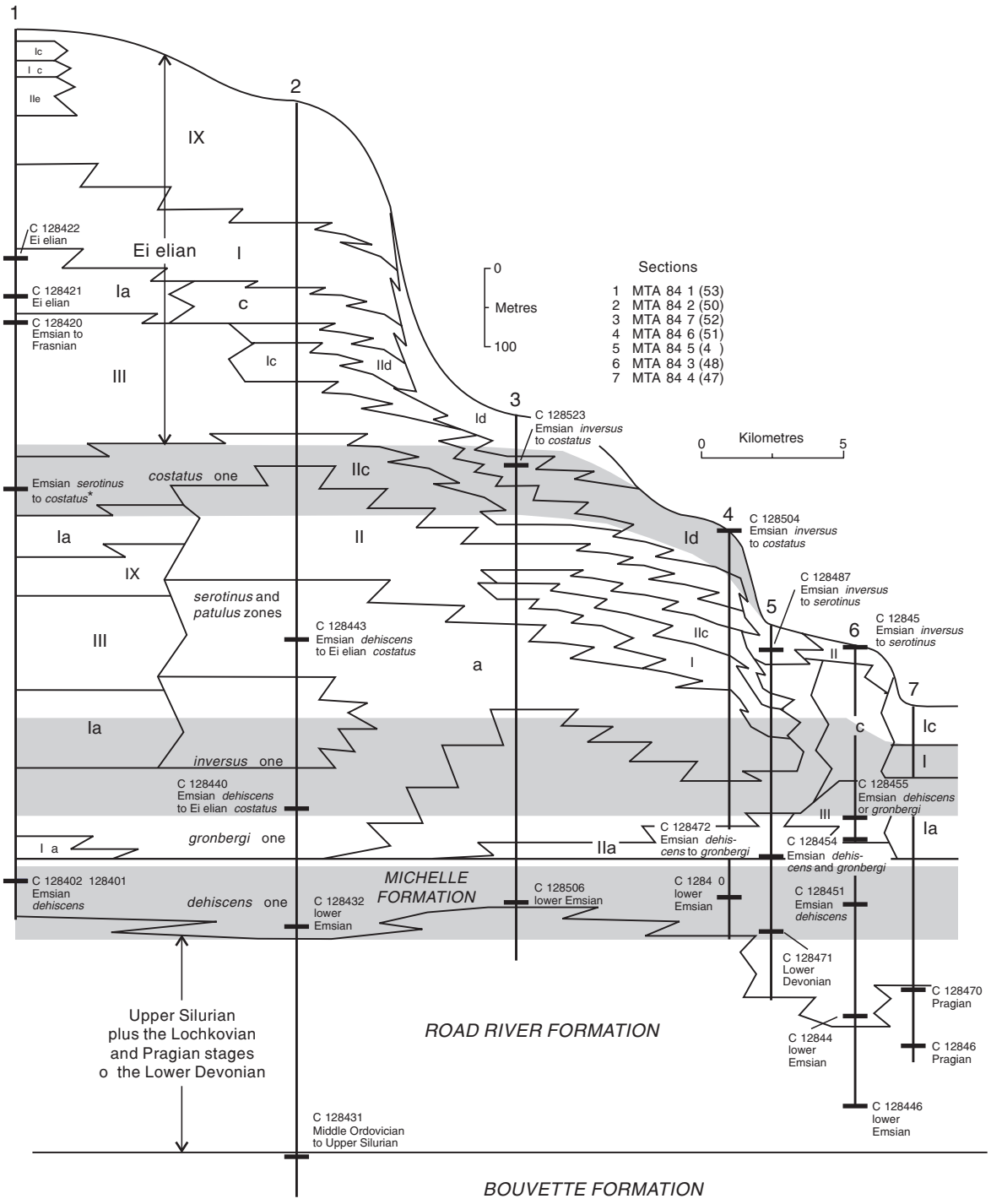
The overall first-order shape of the Ogilvie Formation resembles a rather asymmetrical pancake that is thick along its eastern and southeastern margins and progressively thinner toward the west. Some details concerning second-order variations in the Ogilvie thickness have been documented from a series of seven, closely spaced sections between the Hart and Blackstone rivers. Along this local line of section that passes basinward across the eastern limit of Ogilvie shelf carbonates, thickness changes are not uniform and instead appear to occur in discrete steps such that the Ogilvie thins progressively toward the shelf-to-basin transition (Fig. 50, 54). Paleontological evidence indicates that these thickness changes developed in a definite time sequence (Fig. 54).

The lower contact of the Ogilvie with the underlying Michelle Formation is commonly gradational over several metres, where thick beds of brecciated, slightly argillaceous crinoidal lime wackestones of the Michelle pass upward to unbrecciated, crinoidal and slightly dolomitic basal Ogilvie lime wackestones. In the subsurface, the contact between the radioactive shaly Michelle limestones and the overlying non-radioactive Ogilvie is well defined on gamma-ray and sonic logs (Fig. 21, 22). This contact is, in places, rather sharper where the basal Ogilvie is extensively dolomitized.

In the region of the Dave Lord High, Ogilvie limestones conformably overlie the silty and sandy Mount Dewdney dolostones with a fairly abrupt, but conformable contact that is gradational over less than a metre. In the subsurface, silty dolostones of the Mount Dewdney Formation are also more radioactive than the overlying Ogilvie strata and exhibit a very non-uniform 'spiky' sonic log response and many thin intervals with abruptly high sonic log transit times. Unlike the Michelle Formation, the gamma-ray and sonic log responses of the Mount Dewdney Formation beneath the Ogilvie exhibit no obvious trend with respect to stratigraphic position (Fig. 22).

The upper contact of the Ogilvie with the overlying black shale of the Canol Formation, and with the McCann Hill Chert, appears sharp but is not well exposed on the recessive dip slopes characteristic of the top of the Ogilvie. In the subsurface, this contact is sharp and well defined where the very radioactive shales of the Canol Formation abruptly overlie non-radioactive Ogilvie carbonates (Fig. 21, 22). As previously discussed, the interpretation that this contact is conformable (Williams, 1983) is accepted in this study.

Figure 53. *Stromatoporoid floatstone in an amphiporid wackestone matrix in the upper part of the Ogilvie Formation in the Chevron SOBC WM North Parkin YT D-61 well (8010 ft. or 2442 m below B GSC Calgary photo 416 -1).*



* Conodont determination rom Perry et al. (1 84) and Du ord (1 86)

Figure 54. *Distribution of ages determined from conodonts and macrofossils (Appendix 6) within the Ogilvie Formation along the same line of section as Figure 0. Lower and Middle Devonian conodont biozones are superimposed on the lithostratigraphy as alternately shaded and unshaded bands. The top of the Ogilvie becomes progressively younger westward, towards the centre of the Porcupine Platform.*

Some support for a conformable Ogilvie–Canol contact may be seen in areas where the Ogilvie is represented by a thin basinal limestone, such as at Section 47 (MTA-84-4). At this section, the uppermost unit of the Ogilvie contains numerous calcareous shale interbeds and is clearly transitional to overlying, poorly exposed calcareous shales mapped as part of the Canol Formation (Norris, 1982b). This is analogous to the the relationship of the Limestone and

shale member of the McCann Hill Chert and the Ogilvie Formation of east-central Alaska, where the Limestone and shale member was found to include upper Emsian strata equivalent to upper Ogilvie strata (Clough, 1981; Clough and Blodgett, 1984). A.W. Norris (1985) also recognized this relationship where his 'unnamed shale unit', mapped as Canol Formation by D.K. Norris (e.g., Norris, 1985a), is shown to to be coeval with upper Ogilvie strata.

In the subsurface, basal Canol–Imperial seismic reflectors appear to onlap the Ogilvie in an east-to-west direction as indicated in a seimic line that extends eastward through the southeast limit of Ogilvie shelf carbonates and across basinal Ogilvie strata in the southeast part of the Eagle Plain (Fig. 13). This also suggests that the Ogilvie–Canol contact is probably conformable.

Lithology and internal markers. The Ogilvie Formation has been the object of a detailed lithostratigraphic study along an east–west line of section between the Blackstone and Hart rivers including seven stratigraphic sections (Sections 47-53, MTA-84-1 to MTA-84-7, inclusive; Fig. 50; Dubord, 1986; see also Dubord et al., 1986). This line of section passes eastward from the southeastern area of thick (>1000 m) Ogilvie Formation to the shelf-to-basin transition at Hart River where the Ogilvie is thin (Fig. 55).

The lithologies of the Ogilvie Formation along this line of section are representative of almost all Ogilvie strata, with only a few notable exceptions. Figure 50 shows the distribution of lithological facies developed within the Ogilvie Formation between Blackstone and Hart rivers. The detailed descriptions of these lithofacies by Dubord (1986) are repeated here in an abbreviated manner. Overall, the very thick, shelf-carbonate sequence of Section 53 (1 in Fig. 50) thins eastward over a distance of about 18 km to the shelf-margin sequence of Section 48 (6 in Fig. 50) and the slope sequence of Section 47 (7 in Fig. 50).

Lithofacies IIa, IIb, IIc, III, IVa, Va, Vb, Vc, VIa, VId, and VIIIb occur in the lower parts of the shelf-carbonate sequence along this line of section (sections 1 to 6 in Fig. 50). Most of these facies are dolostones, or are dolomitic limestones, and are part of the dolomite member of the Ogilvie Formation, except in sections such as Section 51 (MTA-84-6), that were close to the Ogilvie shelf margin. Lithofacies Id, IId, IIe, IVb, IVc, Vc, VIa, VIc, VId and IX occur in the upper parts of typical Ogilvie shelf sequences and are dominantly limestone. Lithofacies Ia, Ib and Ic are interpreted as having been deposited seaward, or basinward, of the Ogilvie shelf margin, are also limestone.

Facies I consists of dark grey to black, siliceous crinoidal mudstone and wackestone containing large sheets of weakly graded rubble breccia (Fig. 55–57). Bands of grey chert are common. Subfacies Ia, Ib and Ic contain thick debris-flow deposits composed of chaotically oriented, subangular to subrounded fragments of crinoid lime mudstone and wackestone in a matrix of crinoid lime mudstone. Fragments up to 30 cm in length occur in these breccias and overturned large hemispheroidal stromatoporoids and colonial corals are common. Subfacies Ia contains abundant, stacked, graded crinoidal wackestone and packstone beds that were probably deposited as turbidites or grain flows. Subfacies Id is thin to thick bedded, partly silicified lime mudstone and crinoidal wackestone. Spectacular exposures of very large-

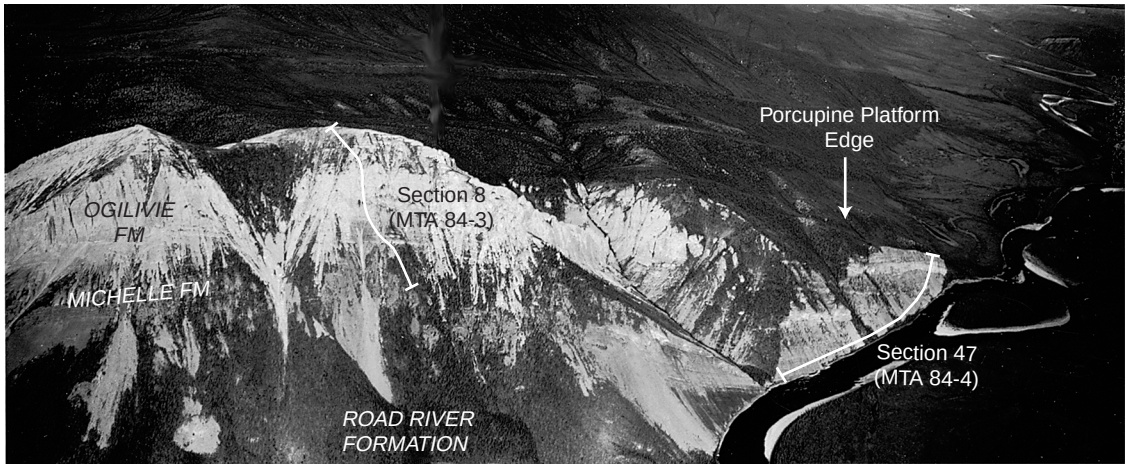


Figure 55. *View northward of a panorama of the Ogilvie Formation at the southeastern edge of Porcupine Platform in the Hart River map area (116H). Thick shelf carbonates of the light grey Ogilvie Formation thin dramatically eastward at Hart River to a thin, darker grey, basinal limestone sequence that merges eastward with the thick Road River Formation exposed in the Richardson Mountains. Section 47 (MTA-84-4) extends along the west bank of Hart River (GSC Calgary photos 4298-22 and 23).*

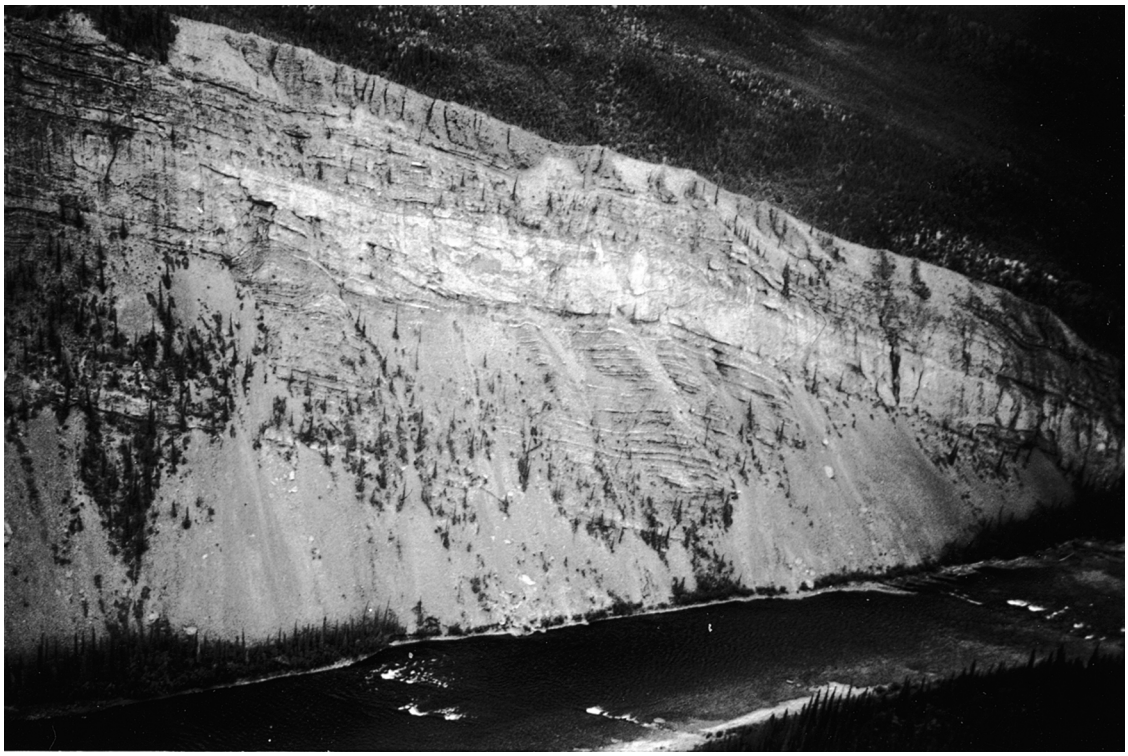


Figure 56. *Closer view of the slope-deposited skeletal lime wackestones and packstones of the Ogilvie Formation at Section 47 (MTA-84-4) along the west bank of Hart River shown in Figure . The light coloured interval in the upper part of the Ogilvie Formation is a series of very thick, crudely graded, debris-flow, rubble breccia beds. Figure 7 is a closer view of the lower part of this interval (GSC Calgary photo 4298-21).*

scale scour fillings occur near or at the top of the Ogilvie Formation in Section 28 (MTA-84-8) within crinoidal wackestones of facies I (Fig. 58).

Facies II is resistant, dark grey, thick- to very thick-bedded, crinoidal lime mudstone. Subfacies IIa contains scattered stromatoporoids and is variably dolomitic. Subfacies IIb is rather uniformly recessive, thin- and nodularly bedded, lime mudstone. Subfacies IIc is a laterally extensive, dark grey lime mudstone containing scattered, small biostromal beds with colonial corals and stromatoporoids. This subfacies serves as a local, dark colored marker bed indicating the approximate top of the dolomite member (Fig. 50). Subfacies IId and IIe are thick bedded, rather featureless lime mudstones containing a few stromatoporoidal biostrome beds.

Facies III occurs only in Section 48 (MTA-84-3) and is largely a very thick-bedded to massive, stromatoporoidal boundstone with a diverse secondary fauna of crinoids, corals and trilobites. Individual hemispheroidal stromatoporoids are up to 1 m across.

Facies IV is mainly light grey weathering, resistant, thin- to thick-bedded, tan to brown pelletal packstone. Subfacies IVa forms part of the dolomite member and is largely dolomitized. Subfacies IVb and IVc, higher in the Ogilvie sequence, are only slightly dolomitic. Subfacies IVb, in the upper part of the Ogilvie, bears a striking resemblance to the Landry Formation of the Mackenzie Mountains in lithology and in its 'ribbed' style of weathering.

Facies V is slightly to moderately resistant, weathers yellowish grey to cream coloured, and is primarily a thin- to thick-bedded dololaminite containing an abundance of laminoid fenestral fabric (Tebbutt et al., 1965). This facies is characteristically, although not entirely, developed within the dolomite member of the Ogilvie Formation (Fig. 50). Subfacies Va contains scattered intervals or interbeds of dolomitized amphiporid wackestone and/or packstone, and irregular, orange- to red-stained bed partings that may represent local discontinuity or exposure surfaces. Subfacies Vb is similar to Va but also contains scattered lenses and lithoclast breccias of platy yellow dololaminite fragments as poorly developed edgewise conglomerates. Subfacies Vc is developed in beds other than the dolomite member and is a light grey to cream coloured, resistant and thick-bedded pelletal lime packstone that contains abundant fenestral fabric.

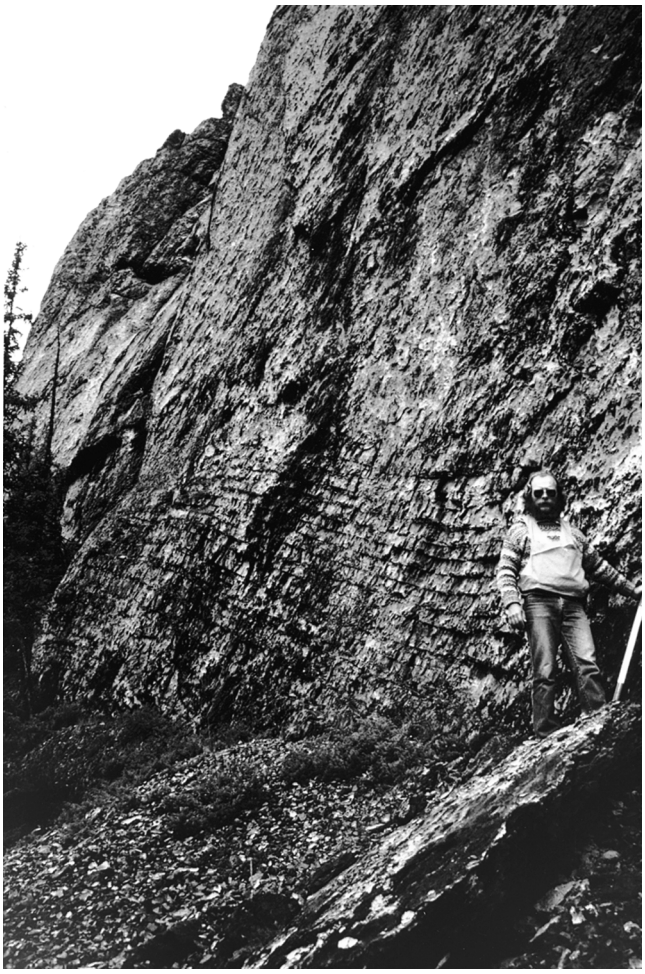


Figure 57. *Debris-flow rubble-breccia limestone beds in Section 47 (MTA-84-4, unit) beside Hart River in the Hart River map area (116H). Beds are crudely graded crinoidal packstones with some stromatoporoid and colonial coral fragments in the upper parts (GSC Calgary photo 4298-26).*

Facies VI is a recessive to slightly resistant, generally medium grey, unfossiliferous lime mudstone. This facies is generally not present in the dolomite member (Fig. 50). Subfacies VIa is a thin- to medium-bedded, light grey, recessive lime mudstone. In the dolomite member this facies is partly dolomitized. Lithoclast breccias, like those of subfacies Vb, also occur in this subfacies. Subfacies VIb is a darker, medium-bedded lime mudstone containing rare ostracodes. Subfacies VIc is dark grey, moderately resistant, thick- and nodularly bedded lime mudstone with dark, argillaceous partings. Subfacies VId is dark, recessive and thin bedded, nearly black lime mudstone containing abundant, dark chert bands and nodules parallel to bedding. Subfacies VId is probably a basin-slope deposit that developed in water depths below effective wave base.

Facies VII is a rather recessive, medium- to dark-grey and greyish brown, medium- to thick-bedded, partly dolomitized lime mudstone. Ostracodes and amphiporids are common but not present everywhere.

Facies VIII is a resistant, medium-grey to greyish brown, thin- to thick-bedded, crinoidal wackestone and packstone. Subfacies VIIIa in the dolomite member is dolomitic and contains beds of dolomitized amphiporid wackestone. Subfacies VIIIb tends to be darker and thicker bedded, and contains some stromatoporoid and coral-bearing beds.

Facies IX is a resistant, medium-grey, thick-bedded, fossiliferous wackestone and packstone. This facies is characterized by a diverse open-marine shelf-type fauna of stromatoporoids, corals, crinoids and brachiopods. Some beds of stromatoporoid and coral boundstone occur in this facies. The subsurface occurrences of 'reefal' Ogilvie (Fig. 45), in the upper parts of the Ogilvie Formation in the Chevron SOBC WM North Parkin YT D-61 (Fig. 52, 53) and SOBC WM Shaeffer Creek YT O-22 wells, are probably thick developments of this facies. Alternatively, the subsurface reefal Ogilvie (see also Pugh, 1983) could be regarded as belonging to facies III, the stromatoporoidal boundstone facies.

The lithological facies described along the line of section in Figure 50 are representative of most of the Ogilvie Formation. However, in the central part of the Ogilvie River map area (116G and 116F, E1/2) there is a very distinctive, locally developed, orange weathering band in the lower part of the Ogilvie Formation, in sections 36, 40, 43, and 31 (MTA-86-11, MTA-86-13, MTA-86-14 and MTA-86-19). It is readily visible from the air as a locally mappable, bright orange marker band within the light to medium grey Ogilvie carbonates, about 50 to 100 m above the base of the Ogilvie, within the dolomite member in sections where this member has been recognized.

This orange band is composed of orange- to red-weathering, medium- to thick-bedded, dolomitic, nearly lithographic lime mudstone in which individual beds grade upward in colour from yellowish grey to yellowish orange. These beds contain abundant limonitic and pyritized, phosphatic fish fragments, particularly along the nodular and irregular bed partings. Mudcracks are common and tend to be infilled with yellow argillaceous material. Also present are sporadic occurrences of fenestral fabric. This orange band is, in effect, a locally developed internal Ogilvie marker horizon. Correlatable internal markers are not recognizable at present within Ogilvie strata in the subsurface, probably because of the great distances between well sections (Fig. 22).

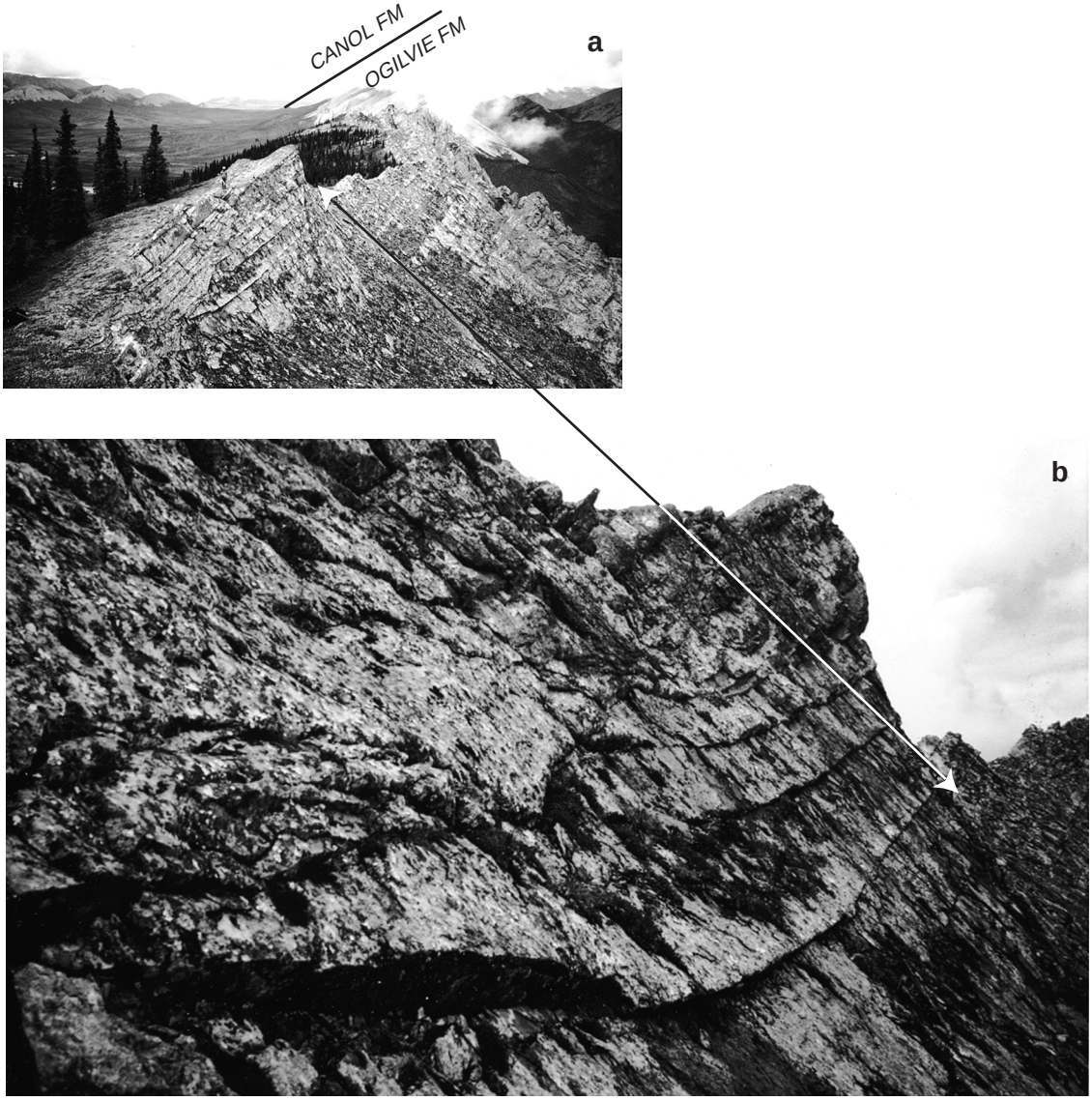


Figure 58. *A view westward of the upper part of the Ogilvie Formation at Section 28 (MTA-84-8, unit 6) in the Hart River map area (116H). Thick to very thick beds of crinoidal wackestone and packstone fill large submarine scours up to 10 m in amplitude. Figure 58B is a closer view of the edge of one of the submarine scours shown in Figure 58A (GSC Calgary photo 4298-19 and 20).*

One final lithology, unique to the Ogilvie Formation, is developed in the Inexco Husky et al. Porcupine YT G-31 well. In this well, Ogilvie strata are fractured and totally dolomitized by late secondary dolomite associated with white, coarsely crystalline, space-filling dolomite cement (Fig. 59). Crinoidal wackestones and packstones typical of the Ogilvie have been completely dolomitized by this late-stage dolomitization event associated with brittle fracturing and minor brecciation. However, white dolomite-filled fractures are distinctly offset by later stylolites. This may indicate that this dolomitization episode predated deep burial.

Depositional setting. Most Ogilvie lithofacies indicate a restricted to open-marine carbonate shelf depositional setting. The array of Ogilvie lithofacies developed along the line of section shown in Figure 50 may be interpreted as having developed during several, distinct depositional episodes. In general, the laminated fenestral dololaminites of the dolomite member developed behind a rimmed shelf margin (Read, 1985; Dubord, 1986) during the first depositional episode, in early to mid-Emsian time. The stromatoporoid boundstones of facies III and pelletal fenestral packstones of facies Vc represent the stable shelf margin shoals that passed abruptly eastward into a

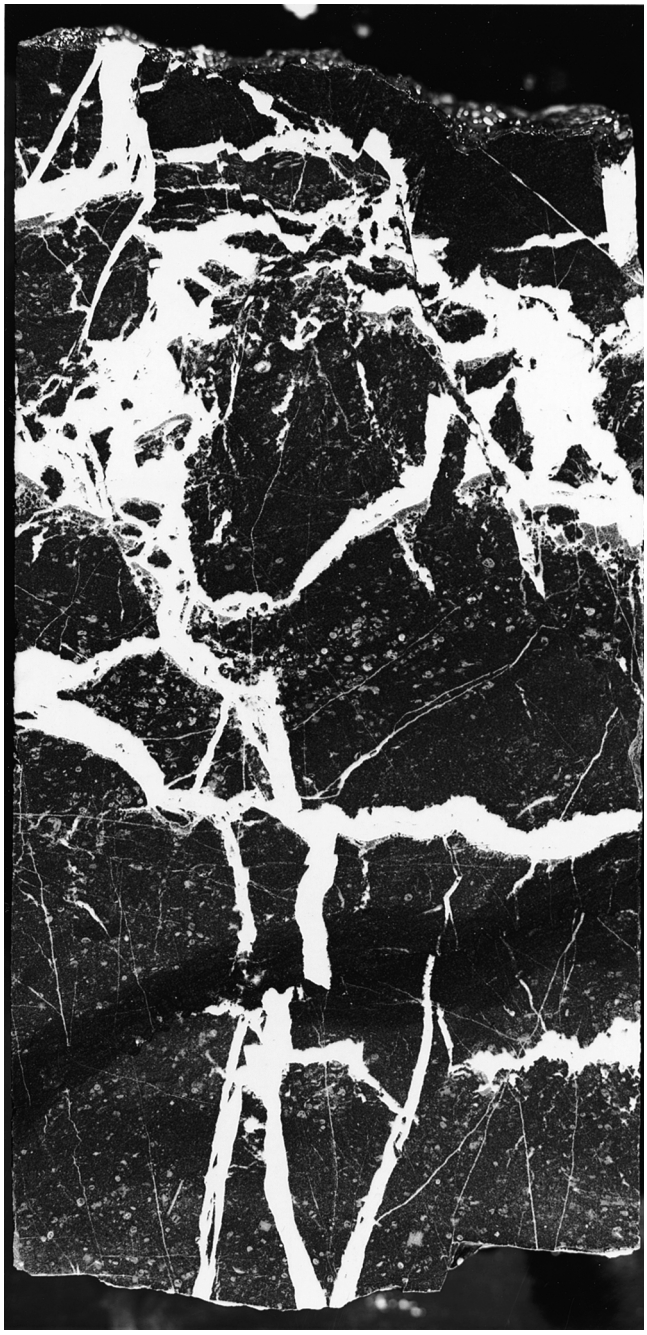


Figure 59. *Dolomitized crinoidal wackestone in the upper part of the Ogilvie Formation in the Inexco Husky et al. Porcupine YT G-31 well (036. ft. or 1 3 . m below B GSC Calgary photo 416 -6). Very coarsely crystalline, white sparry dolomite cements fractures and minor breccia. Note the strong offset of the white, dolomite-filled fractures by later stylolites. Some geopetal fabric may indicate sediment-floored cavities. Two-holed crinoids (**Gasterocoma**? **bicaula**) are abundant.*

submarine slope. Periplatform debris flows and hemipelagic sediments accumulated on this slope.

It is likely that the nearly emergent shelf margin impeded the interchange of shelf seawater with seawater from open-marine areas of Richardson and Blackstone troughs to the east. This physical restriction to seawater interchange probably led to elevated seawater salinity across the shelf interior and enhanced the potential for dolomitization, resulting in the development of the Ogilvie dolomite member.

The absence of shelf-margin facies in the upper Ogilvie may indicate that deposition during the middle to late Emsian occurred in a more open-marine ramp setting without a distinct shelf margin. The extensive blanket of crinoidal wackestones of subfacies VIIIb above the dolomite member (Fig. 50) probably indicates that the low-energy, restricted-shelf setting of the underlying dolomite member had changed to a submarine ramp setting. During this time, basinal deposits of subfacies Id and VId encroached toward the shelf interior, indicating that deposition occurred during marine transgression.

During late Emsian to Eifelian time, there was a steepening of the ramp profile and possibly a brief re-establishment of a rimmed shelf. The pelletal fenestral lime packstones of subfacies Vc in the upper part of section 2 (Fig. 50) may represent the facies of a short-lived rimmed shelf-margin. This was probably immediately followed by a return to more open-marine ramp deposition, culminating in deposition of the open-shelf fossiliferous wackstones of subfacies IX at the top of the Ogilvie Formation in sections 1 and 2 (Fig. 50).

Seismic section EP-5, parallel to, and north of, the line of section of Figure 50 shows the basal reflectors of the Canol–Imperial sequence onlapping westward onto the Ogilvie Formation (Fig. 13). This is consistent with the hypothesis that shales of the Canol Formation simply infilled and onlapped submarine topography after sea-level rise had terminated the accumulation of Ogilvie carbonates. Ogilvie carbonate deposition may also have been slowed if Canol siliclastic sedimentation increased water turbidity.

Organic maturation at the Ogilvie–Canol contact. The most prospective lower Paleozoic hydrocarbon source rocks in the study area and in the subsurface of Eagle Plain are the organic-rich, black shales of the Canol Formation. In Eagle Plain, these strata attain TOC values of 8.6%, with residual kerogens a mixture of type II and type III organic material (Link et al., 1989). Link et al. (1989) determined that Canol strata are overmature throughout Eagle Plain and that they became thermally mature, and probably generated hydrocarbons in Devonian to Carboniferous time.

A map showing the level of organic maturity near or at the top of the Ogilvie Formation is shown in Figure 60. Data from conodont alteration indices (CAI) values, reported in

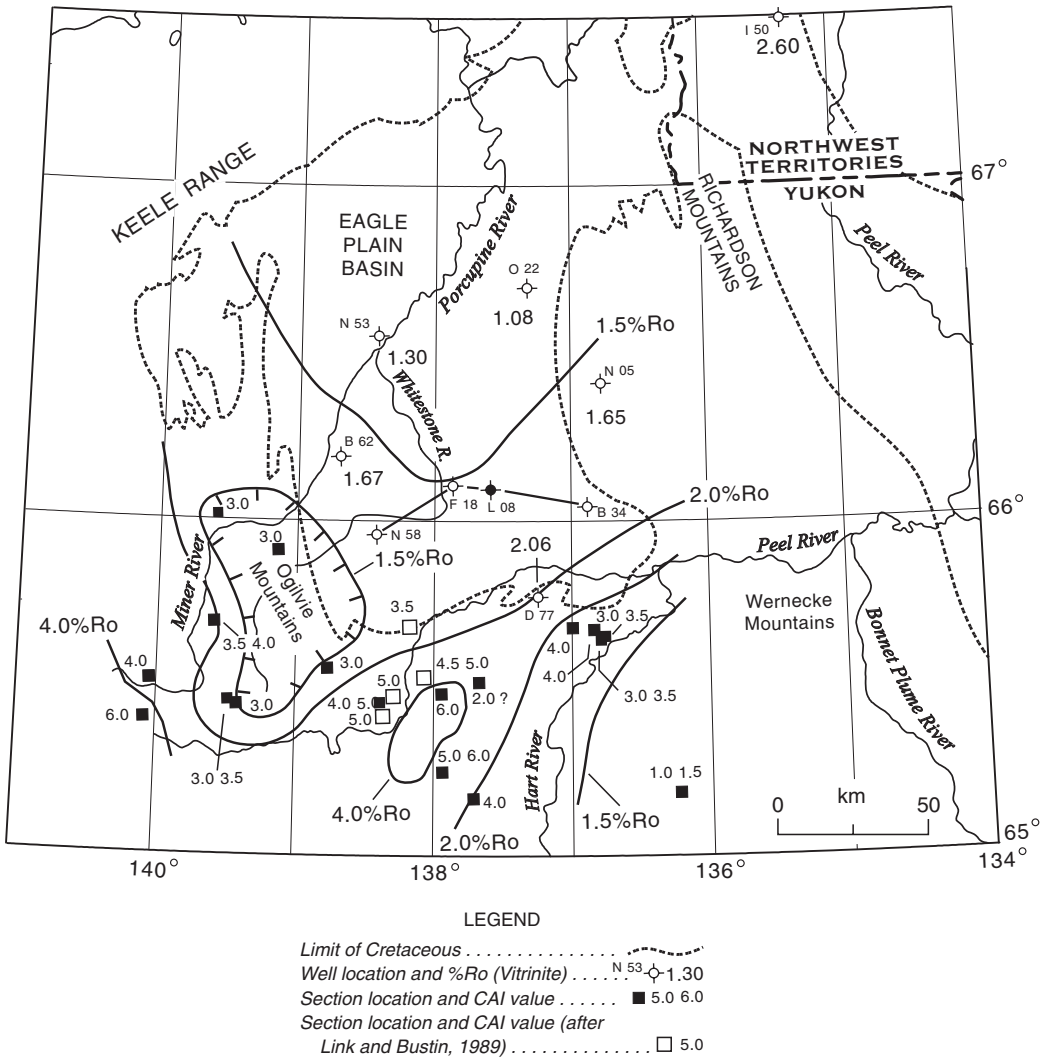


Figure 60. *Map showing level of organic maturity at the top of the Ogilvie Formation. Maturation levels shown as vitrinite (%Ro) isoreflectance contours. Subsurface vitrinite reflectances are from Link and Bustin (1989). CAI indices from conodonts are from data in this study and from Link and Bustin (1989). CAI indices have been converted to their approximate vitrinite reflectance %Ro equivalent value (Dougherty et al., 1991 Utting et al., 1989).*

Table 6, are converted to their approximate equivalent mean random vitrinite reflectance (%Ro) using the nomographs of Dougherty et al. (1991) and of Utting et al. (1989) for the correlation of thermal maturity indicators. The values for vitrinite reflectance at the top of the Ogilvie Formation in the subsurface are from Link and Bustin (1989). In wells where vitrinite reflectance data were obtained only from strata younger than the Canol or Ogilvie formations, the depth-log (%Ro) equations of Link and Bustin (1989) were used to extrapolate the level of thermal maturity downhole to the Ogilvie–Canol contact.

The pattern of thermal maturity at the top of the Ogilvie Formation is not uniform across the region. Reflectance values increase generally southeastward and southwestward from less than 1.5% Ro to about 4.0% Ro. However, there are large reversals to this general pattern of southward maturity increase. Southeast of the Blackstone D-77 well, maturity reaches a maximum of slightly greater than 2.0% Ro and decreases to less than 1.5% Ro east of Hart River. A more complex pattern of maturity occurs in the southwest part of the area, where the southwest corner of Eagle Plain is probably part of a region of relatively low thermal maturity (<1.5% Ro) surrounded by more mature Ogilvie–Canol.

The level of organic maturity at the top of the Ogilvie (Fig. 60) is broadly consistent with Rock-Eval data from Eagle Plain wells that penetrate Devonian strata (Fig. 61;

Table 6
Conodont colour alteration indices for conodont samples from the Lower Devonian Ogilvie Formation or equivalent strata in the Ogilvie Mountains

Section name (field name; report number)	Location (latitude; longitude)	Formation and height (m) above base and/or (distance (m) from top)	Conodont colour alteration index - CAI value	GSC locality number for samples
MTA-82-15; 16	65.1889; 136.2500	Hume Fm (0.0)	1.0 to 1.5	C-12425
MTA-86-29; *	65.5333; 140.1167	Ogilvie Fm (3.0)	4.0	C-151009
MTA-86-1; 38	65.4833; 137.9583	Ogilvie Fm (0.0)	6.0	C-149449
MTA-86-4; 15	65.1667; 137.7167	Ogilvie Fm 118.0 (80.0+)	4.0	C-149481
MTA-86-6; 39	65.3667; 138.4583	Ogilvie Fm 523.0 (83.0)	4.0 to 5.0	C-149500
MTA-86-2; 42	65.5167; 137.6917	Ogilvie Fm 232.0 (541.0)	2.0	C-149465
MTA-86-11; 36	65.4583; 139.4583	Ogilvie Fm 420.0 (28.0)	3.0 to 3.5	C-15080
MTA-86-14; 43	65.5583; 138.7833	Ogilvie Fm 721.0 (5.0)	3.0	C-150839
MTA-86-16; 55	66.0167; 139.6000	Ogilvie Fm 0.0	3.0	C-150906
MTA-86-19; 31	65.4500; 139.4167	Ogilvie Fm 30.0 (574.0)	3.0	C-150927
MTA-86-19; 31	65.4500; 139.4167	Ogilvie Fm 604.0 (0.0)	3.0	C-150941
MTA-86-21; 20	65.2250; 137.9333	Road River Fm 108.0 (187.0)	5.0 to 6.0	C-150952
MTA-86-26; 54	65.6917; 139.6000	Ogilvie Fm 17.0 (184.0)	3.5 to 4.0	C-150987
MTA-86-26; 54	65.6917; 139.6000	Ogilvie Fm 96.0 (105.0)	6.0	C-150988
MTA-86-P2; 26	65.4000; 140.1000	Ogilvie Fm 85.0 (25.0)	6.0	C-151019
MTA-86-P5*	65.9125; 139.2333	Ogilvie Fm 0.0	3.0	C-151021
MTA-86-P5*	65.9125; 139.2333	Ogilvie Fm (0.0)	3.0	C-151023
MTA-84-3; 48	65.6500; 136.7667	Ogilvie Fm 23.0 (252.0)	3.0 to 3.5	C-128454
MTA-84-3; 48	65.6500; 136.7667	Ogilvie Fm 265.0 (10.0)	3.0 to 3.5	C-128459
MTA-84-5; 49	65.6500; 136.8083	Ogilvie Fm 3.0 (297.5)	4.0	C-128472
MTA-84-5; 49	65.6500; 136.8083	Ogilvie Fm 253.0 (48.0)	4.0	C-128487
MTA-84-6; 51	65.6711; 136.8542	Ogilvie Fm 419.0 (0.0)	4.0	C-128504
MTA-84-7; 52	65.6814; 137.0114	Ogilvie Fm 477.0 (91.5+)	4.0	C-128523

*Sections not described or numbered in report

Snowdon, 1987). Wells on the southeast side of Eagle Plain display T_{max} values of 450 to 460° C at the top of the Devonian Ford Lake Formation. This indicates an equivalent vitrinite reflectance value of about 1.2% to 1.6% Ro (Dougherty et al., 1991), which is consistent with the location of these wells in a region where slightly deeper Ogilvie strata have a maturity between 1.5 and 2.0% Ro.

The Rock Eval T_{max} profile of the Murphy Mesa PB Whitestone YT N-58 well departs from this generalization in that Cretaceous strata in this well have high T_{max} values of 450 to 460°C. However, immediately beneath the Cretaceous section T_{max} returns to lower values. The anomalously high Cretaceous T_{max} values in this well might in part be the consequence of maturation of type III, or dominantly herbaceous organic matter which tends to yield higher T_{max} values at lower levels of thermal maturity (Peters, 1986).

This assessment is confirmed by vitrinite reflectances recorded by Link and Bustin (1989) at this well, which show that the Ettrain Formation at the base of the well (Fig. 61) has a reflectance value of only about 0.8%Ro. If we assume that the same approximate thickness of strata (about 700 m) lies between the Jungle Creek and Ogilvie formations in this well as in the SOBC Blackstone D-77 well, then using the depth-log (%Ro) equation of Link and Bustin (1989) for the Whitestone N-58 well, an extrapolated vitrinite reflectance value of about 0.9%Ro can be calculated for the top of the Ogilvie Formation at this well.

This suggests that the 1.5% Ro reflectance contour bordering the low reflectance region in the southwest corner of Eagle Plain could be moved to a position east of this well. This has not been done because vitrinite reflectances were not recorded directly from the Ogilvie Formation at the Whitestone N-58 well. Nonetheless, there is evidence that Ogilvie strata in the southwest corner of Eagle Plain may be at a present-day thermal maturity consistent with the beginning of gas generation. Ogilvie and Canol strata in the rest of the Eagle Plain Basin are at a present-day thermal maturity consistent with gas generation.

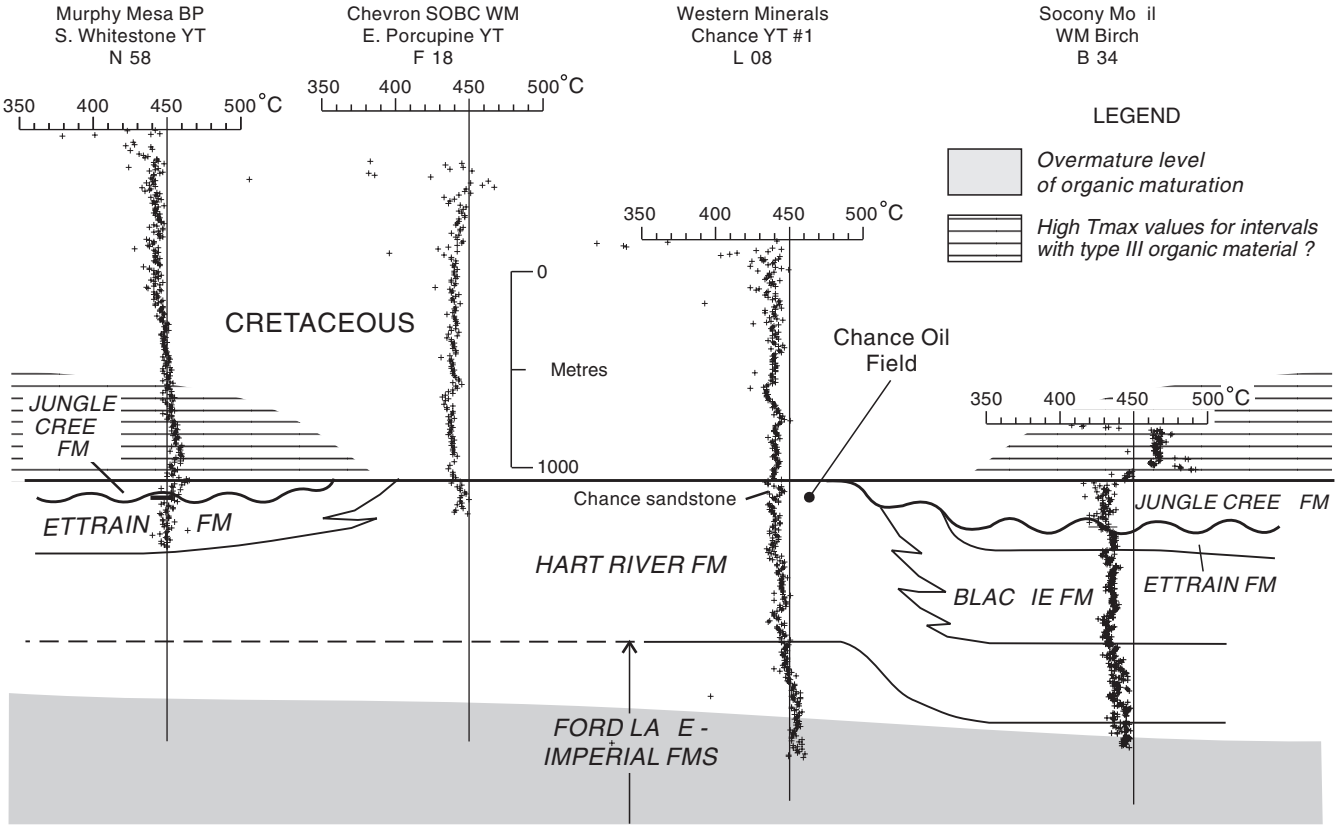


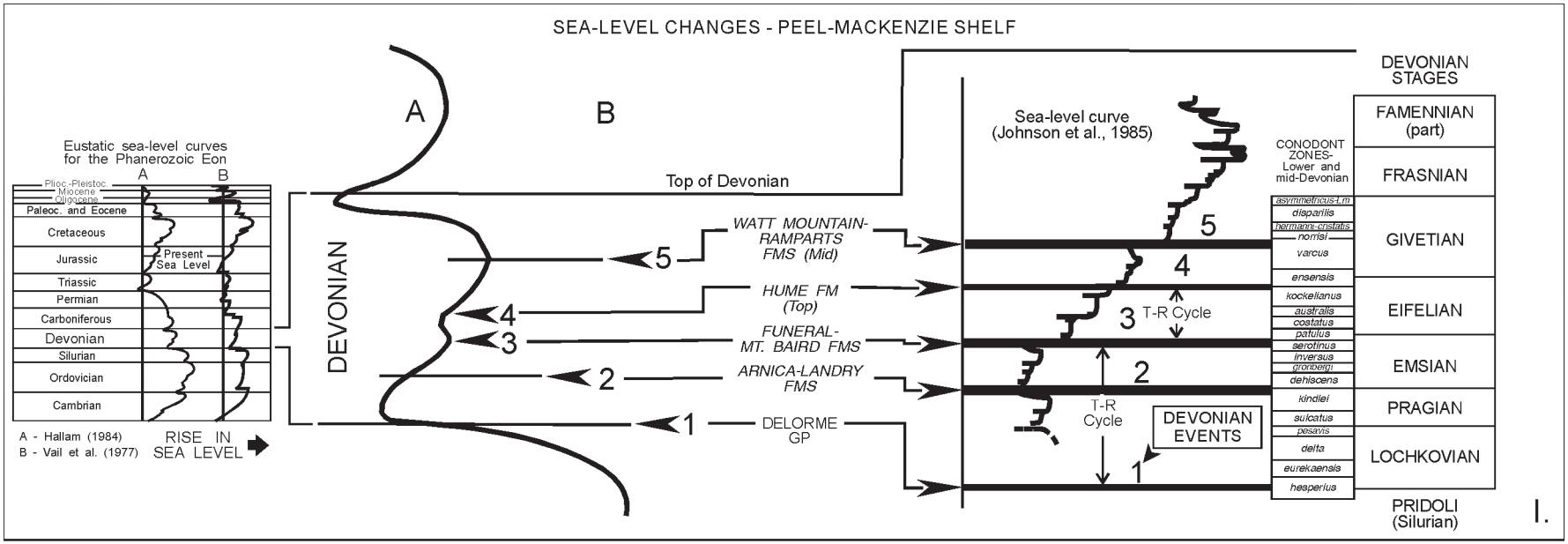
Figure 61. *Well profiles of Rock-Eval T_{max} (e.g., Peters, 1986) along an east–west transect across Eagle Plain. Organic-rich upper Paleozoic strata are in the mature stage of oil generation. The overmaturity of the basal Cretaceous in the Whitestone N- 8 well is due to the predominance of Type III organic material. The oil field in the Chance Sandstone Member of the Hart River Formation is well within the "oil window" in the Western Minerals Chance YT #1 L-08 discovery well. Figure 60 shows this line of section.*

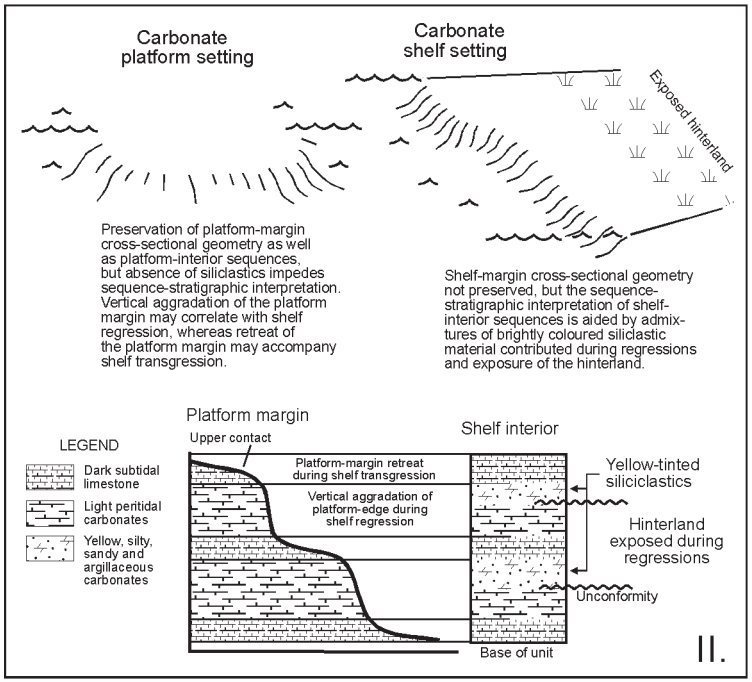
EUSTASY AND EARLY PALEOZOIC SEDIMENTATION

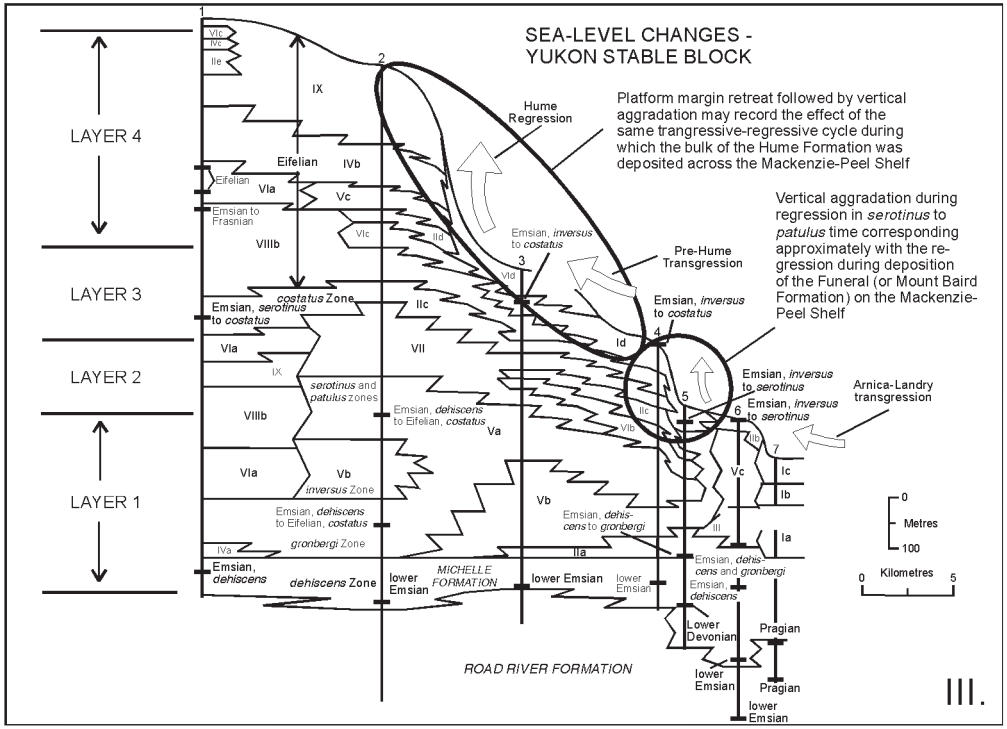
The lower Paleozoic sequence described in this report was deposited during part of the first-order base-level rise–fall cycle that occurred during Paleozoic time (part I in Fig. 62). Superimposed on the two great first-order Phanerozoic sea-level changes are second-order sea-level changes of smaller magnitude and shorter duration. These second-order cycles, though not precisely defined (Vail et al., 1977), correspond in North America to the lithostratigraphic sequences defined by Sloss (1963) as continent-wide blankets of strata deposited during marine transgressions and regressions, corresponding to cycles of rising and falling sea level. Second-order cycles are separated by interregional unconformities formed during sea-level lowstands, which mark the boundaries between these sequences. It has been argued that these interregional unconformities provide strong evidence in support of a eustatic origin for second-order sea-level changes (Vail et al., 1977).

There is little doubt that the Sloss (1963) sequences are represented in the stratigraphy of the study area. Sequences developed in a typical manner across the Mackenzie–Peel Shelf, and major unconformities are found at stratigraphic levels (Fig. 10) that correspond to Sloss's (1963) sequences or to the predicted times of sea-level lowstand. Vail et al. (1977, Table 1), using the Sloss (1963) sequences as a guide, determined that major second-order sea-level lowstands occurred in Early Cambrian time, in early Middle Ordovician time, and in Early Devonian time, in addition to those at later times. Regional unconformities corresponding to these three second-order sea-level lowstands occur beneath the Franklin Mountain Formation, beneath the Mount Kindle Formation, and beneath the Peel Formation of the Delorme Group of the Mackenzie–Peel Shelf sequence (Fig. 10).

However, the lower Paleozoic succession of the Yukon Stable Block departs significantly from this idealized concept of second-order cycles and sequence stratigraphy.


SEA-LEVEL CHANGES - PEEL-MACKENZIE SHELF
Eustatic sea-level curves for the Phanerozoic Eon
A
B
Plioc.-Pleistoc.
Miocene
Oligocene
Paleoc. and Eocene
Cretaceous
Jurassic
Present Sea Level
Triassic
Permian
Carboniferous
Devonian
Silurian
Ordovician
Cambrian
A - Hallam (1984)
B - Vail et al. (1977)
RISE IN SEA LEVEL
DEVONIAN
Top of Devonian
WATT MOUNTAIN-RAMPARTS FMS (Mid)
HUME FM (Top)
FUNERAL-MT. BAIRD FMS
ARNICA-LANDRY FMS
DELORME GP
Sea-level curve (Johnson et al., 1985)
T-R Cycle
T-R Cycle
DEVONIAN EVENTS
CONODONT ZONES-Lower and mid-Devonian
asymmetricus-t.m
disparilis
hermann-cristatis
norrisi
varcus
ensensis
kockelianus
australis
costatus
patulus
serotinus
inversus
gronbergi
dehiscens
kindlei
sulcatus
pesavis
delta
eurekaensis
hesperius
DEVONIAN STAGES
FAMENNIAN (part)
FRASNIAN
GIVETIAN
EIFELIAN
EMSIAN
PRAGIAN
LOCHKOVIAN
PRIDOLI (Silurian)
I.


Carbonate platform setting
Carbonate shelf setting
Exposed hinterland
Preservation of platform-margin cross-sectional geometry as well as platform-interior sequences, but absence of siliclastics impedes sequence-stratigraphic interpretation. Vertical aggradation of the platform margin may correlate with shelf regression, whereas retreat of the platform margin may accompany shelf transgression.
Shelf-margin cross-sectional geometry not preserved, but the sequence-stratigraphic interpretation of shelf-interior sequences is aided by admixtures of brightly coloured siliclastic material contributed during regressions and exposure of the hinterland.
LEGEND
Dark subtidal limestone
Light peritidal carbonates
Yellow, silty, sandy and argillaceous carbonates
Platform margin
Shelf interior
Upper contact
Platform-margin retreat during shelf transgression
Vertical aggradation of platform-edge during shelf regression
Yellow-tinted siliciclastics
Hinterland exposed during regressions
Unconformity
Base of unit
II.


SEA-LEVEL CHANGES - YUKON STABLE BLOCK
LAYER 4
LAYER 3
LAYER 2
LAYER 1
Hume Regression
Platform margin retreat followed by vertical aggradation may record the effect of the same trangressive-regressive cycle during which the bulk of the Hume Formation was deposited across the Mackenzie-Peel Shelf
Pre-Hume Transgression
Vertical aggradation during regression in serotinus to patulus time corresponding approximately with the regression during deposition of the Funeral (or Mount Baird Formation) on the Mackenzie-Peel Shelf
Arnica-Landry transgression
Emsian, inversus to costatus
Emsian, inversus to serotinus
Emsian, serotinus to costatus
Emsian, dehiscens to Eifelian, costatus
Emsian, dehiscens to gronbergi
Emsian, dehiscens and gronbergi
Emsian, dehiscens
costatus Zone
serotinus and patulus zones
inversus Zone
gronbergi Zone
dehiscens Zone
Eifelian
Emsian to Frasnian
MICHELLE FORMATION
ROAD RIVER FORMATION
lower Emsian
Lower Devonian
Pragian
Metres
Kilometres
III.

Only the sub-Cambrian unconformity is developed across the entire Yukon Stable Block, beneath the Bouvette, Taiga, Illtyd and Slats Creek formations (Fig. 5, 9, 22). The Middle Ordovician unconformity, which should occur within the shallow-water carbonates of the Bouvette Formation is noteworthy by its absence (Fig. 9, 22). Finally, the expected Early Devonian unconformity is present only in the region of the Dave Lord High (Fig. 22). The 'sub-Devonian' unconformity could perhaps not be expected to be developed in areas of basinal shale deposition, such as Blackstone Trough, but it should be present within isolated shallow-water carbonate platforms, such as Royal Mountain Platform that occupied parts of Blackstone Trough.

One explanation for this lack of correspondence between the regional unconformities developed within the Mackenzie–Peel Shelf succession and those of the Yukon Stable Block succession may be that second-order cycles of sea-level change represent primarily relative rather than eustatic sea-level changes. It is distinctly possible that the Mackenzie–Peel Shelf, as part of the North American continent, underwent tectonic uplift in Middle Ordovician time. The force of this uplift simply may not have been transmitted to the Yukon Stable Block, which underwent continuous subsidence throughout the Ordovician. A similar explanation may apply to the unexpected absence of the 'sub-Devonian' unconformity in large areas of the Yukon Stable Block. Purely eustatic second-order sea-level changes should have affected both the Mackenzie–Peel Shelf and the Yukon Stable Block equally. The fact that this is not true suggests that second-order sea-level changes were relative, rather than eustatic.

The more detailed sedimentology and age control of the Michelle and Ogilvie formations along the line of section in Figures 50 and 54 provide a means of comparison with published third-order cycles of Devonian sea-level change (Fig. 62). Early and Middle Devonian third-order sea-level changes are well expressed in the Mackenzie–Peel Shelf sequence (Fig. 10, 62). The sea-level curves of Hallam (1984), and to a lesser extent of Johnson et al. (1985), show sea-level changes that approximately correspond to the transgressive–regressive cycles of the Mackenzie–Peel Shelf sequence. On Mackenzie–Peel Shelf, pre-Devonian to earliest Devonian regression was followed by Delorme Group sedimentation as the sea advanced across the exposed shelf. After inundation of the shelf, further sea-level rise resulted in deposition of the clean carbonates of the Arnica and Landry formations.

After Landry deposition, regression at the end of Emsian time caused exposure of southeastern parts of Mackenzie–Peel Shelf and deposition of the Mount Baird Formation as a sea-level lowstand wedge of silty shales in low areas on the shelf margin. This regression coincided with the disconformity at the base of the Hume and Headless formations, and the unconformity at the base of the Ebbutt Member of the Chinchaga Formation (Morrow and Geldsetzer, 1988, 1992). Erosion associated with subaerial exposure (e.g., part II of Fig. 62) at this time probably supplied siliciclastic sediments to the site of Mount Baird deposition. This episode of sea-level fall is clearly shown on the Hallam (1984) sea-level curve, and, in a less pronounced manner, on the Johnson et al. (1985) curve. Lenz (1982), in a more local study of sea-level changes in western North America, also showed a pronounced sea-level fall in early Eifelian time, coinciding with the sub-Hume regression (part I of Fig. 62). Vail et al. (1977) did not identify a sea-level fall in the late Emsian to early Eifelian time interval (Part I in Fig. 62) although both Hallam (1984) and Vail et al. (1977) recognized the later Watt Mountain regression as a mid-Givetian sea-level drop. Nonetheless, it is clear that the majority of inferred eustatic secular changes of sea level that have been published recognize a third-order sea-level fall in late Emsian and/or early Eifelian time.

There is some indication that these early to mid-Devonian changes in sea level also affected sedimentation of the Ogilvie Formation on the Yukon Stable Block. As a first approximation, the Ogilvie Formation along the line of section shown in part III of Figure 62 can be regarded as having been deposited as a series of layers. The lowermost part, or layer 1 (Fig 62), from the base of the Ogilvie upward to the top of sections 5 and 6, was deposited during the time represented by the *gronbergi* to *serotinus* conodont zones, which coincides with deposition of the Arnica and Landry formations during the rise of sea level across the Mackenzie–Peel Shelf.

Figure 62. *Part I shows the Devonian parts of published eustatic sea level curves (Hallam, 1984 Vail et al., 1977 Johnson et al., 198) plotted on a common time scale. On Mackenzie–Peel Shelf, the combined Delorme Group and the Arnica and part of the Landry Formation comprise a distinct transgressive–regressive (T–R) cycle, beginning at event 1, the 'sub-Devonian unconformity', and extending through events 2 and 3. The Mount Baird Formation, like its southern counterpart, the Funeral Formation, was formed primarily during the regressive phase (event 3) of this T–R cycle. The overlying Hume Formation forms a single T–R cycle that extends from event 3 to the regressive top surface of the Hume Formation (event 4). On the Yukon Stable Block, these cycles are less well developed. Regressions on Mackenzie–Peel Shelf may correlate with periods of vertical aggradation of the shelf edge of Porcupine Platform, and transgressions with periods of shelf-edge retreat, as shown in parts II and III.*

The next overlying but thinner Ogilvie layer (layer 2) is the increment of Ogilvie section that accumulated between the top of section 5 and the top of section 4 during the time represented by the *serotinus* to *costatus* zones (i.e., the *patulus* Zone). This interval has a greater component of aggradational deposition, or upbuilding, than the underlying, more time-trangressive layer. It is possible that this time of more aggradation during Ogilvie shelf-carbonate deposition coincided with the sub-Hume regression and exposure, and Mount Baird deposition on the Mackenzie–Peel Shelf.

The succeeding layer (layer 3) includes early Eifelian strata between the tops of section 4 and section 3 and was deposited during a return to more time-transgressive sedimentation that accompanied relatively rapid sea-level rise. This return to rapid sea-level rise during Ogilvie deposition coincides with the rapid transgression that inundated the Mackenzie–Peel Shelf following post-Landry exposure and preceding Hume deposition. The topmost, middle to upper Eifelian, Ogilvie layer (layer 4) may represent a return to a more aggradational style of deposition and may be coincidental to the bulk of Hume deposition, which was as a progradational sedimentary wedge during the sea-level highstand that followed the pre-Hume sea-level rise.

None of the foregoing constitutes proof that depositional episodes and inferred Devonian sea-level changes can be correlated between the Mackenzie–Peel Shelf and the Yukon Stable Block. The evidence is, nonetheless, strongly suggestive that such a correlation exists for the smaller scale, third-order cycles. If true, it implies that these shorter term sea-level changes could be eustatic in origin.

This tends to corroborate the comments of Vail et al. (1977) who suggested that geotectonic factors are responsible for both first- and second-order sea-level changes. If true, it would be inherently difficult to decide on the magnitude, or even the existence of the eustatic component of sea-level change responsible for second-order cycles because of the extremely variable tectonic response of crustal segments underlying paleogeographic provinces such as the Mackenzie–Peel Shelf and the Yukon Stable Block. This may explain why the Middle Ordovician unconformity, marking a second-order cycle boundary, is missing across the Yukon Stable Block. These areas may have been tectonically decoupled from each other during the early to mid-Ordovician tectonism that elevated most of North America.

Unlike second-order cycles, shorter term third-order cycles may be largely glacial in origin and primarily reflect relatively rapid global eustatic sea-level changes (Vail et al., 1977). This may explain why the sub-Hume regression and transgression, and the Hume regression are expressed as vertical changes in the geometry of the Ogilvie shelf margin (Fig. 62). Paradoxically, the larger unconformities and sedimentary cycles display less interregional correlation than do the smaller unconformities and their associated sedimentary cycles. This may reflect fundamental differences in their origins.

ECONOMIC CONSIDERATIONS

An assessment of the hydrocarbon potential of the lower Paleozoic in the study area involves consideration of appropriate organic-rich source rocks and their relations both spatially and temporally, to porous and permeable strata that could serve as potential reservoir rocks for hydrocarbons. The petroleum source potential and organic maturation studies of Link et al. (1989) and Link and Bustin (1989) cover a region centred on northern Yukon Territory that is almost the same as the area of this study. They determined that the foremost organic-rich source rock of the lower Paleozoic is the black, bituminous shale of the Canol Formation. This organic-rich source rock contains residual kerogen measured as total organic carbon (TOC) of between 2.4 and 8.6% TOC. The only other possible organic-rich source rock of significance is the Road River Formation. The overall source rock potential of the Road River was rated as poor by Link et al. (1989) but they did note that some Road River strata, the black shales of the Vittrekkwa and Loucheux subdivisions of the Road River in the Richardson Anticlinorium, yielded high TOC values of up to 9.6%. Black shales equivalent to these Road River subdivisions occur across the Yukon Stable Block (Fig. 9, 19, 22) and are potential hydrocarbon source rocks. This type of interlayering of potential Road River source-rock strata and lower Paleozoic carbonates does not occur across the Mackenzie–Peel Shelf region (Fig. 19, 22). Both the Canol and Road River shales can act as reservoir seals for potential reservoirs in carbonates underlying these units in both the Yukon Stable Block and the Mackenzie–Peel Shelf regions.

Porous strata suitable as reservoir rock can be predicted to occur at various stratigraphic levels within carbonate strata beneath these source beds: biostromal, or bioclastic layers in the Mount Kindle and Bouvette formations; oolitic carbonate sand bodies in the Franklin Mountain and Bouvette formations; karsted and vuggy dolostones in the Franklin Mountain and Bouvette formations; biostromal to biohermal stromatoporoidal beds at the top of the Ogilvie Formation; slightly porous crinoidal wackestones and packstones within the Ogilvie; and Ogilvie limestones that have undergone later fracturing, dolomite cementation and dolomitization (Fig. 59). Stromatoporoidal Ogilvie limestones are particularly well developed in a region flanking the west side of Richardson Trough (Fig. 45; Pugh, 1983).

Pugh (1983) emphasized that the carbonate-to-shale transition belts flanking both sides of Richardson Trough are major prospective areas for hydrocarbon accumulations. Wells, such as Mobil Gulf Peel YT H-71 and Socony Mobil-WM South Tuttle YT N-05, on the east and west sides respectively, of Richardson Trough, have both tested gas to surface. The H-71 well tested gas from the Mount Kindle Formation (less than 100Mcf/d) and 'kicked' gas to surface from the Landry while drilling. The porous zones in this well are stratigraphically closed on its updip, or western side by Road River shale of Richardson Trough (Pugh, 1983). The N-05 well tested gas to surface from the Ogilvie Formation on the west side of Richardson Trough. North of Blackstone Trough, gassy water was recovered from the Bouvette Formation in the SOBC Blackstone YT D-77 well in drill stem tests. This well is also located within a broad shale-to-carbonate transition belt along the northern side of the Blackstone Trough. In the north-central part of the Yukon Stable Block, gas-cut mud and water were recovered from the Bouvette Formation in the Western Minerals North Hope YT N-53 well and from the Ogilvie Formation of the Peel Plateau Eagle Plains YT #1 N-49 well. The SOBC Shaeffer Creek YT O-22 well tested gas from from biostromal beds within the mass of reefal Ogilvie (near the top of the Ogilvie; Fig. 45). However, reefal Ogilvie strata penetrated by other wells appears to be tight and yielded no hydrocarbons (Norris, 1985).

East of Richardson Trough, gas was recovered from the Landry Formation in the Amoco PCP B-1 Cranswick YT A-42 well (Fig. 18) and from Arnica dolostones in the MCD GCO Northup Taylor Lake YT K-15 and Atlantic et al. Ontaratue H-34 wells.

The occurrence of gas in all these wells is consistent with the present-day overmaturity of organic material in lower Paleozoic strata (Link and Bustin, 1989; Fig. 60). Residual reservoir bitumen is fairly common in both the surface and subsurface. Bitumen occurs in the subsurface in the Ronning Group of the Peel H-71 well and in the Bouvette of the Blackstone D-77 well, and is commonly recorded from lower Paleozoic strata in well history reports. Modelling studies of organic maturity led Link and Bustin (1989) to suggest that the Road River and Canol source rocks became thermally mature in Carboniferous to early Mesozoic time. Undoubtedly, the more mobile gas generated from the oil that may have been originally held in these reservoirs has largely escaped, leaving behind residual reservoir bitumen with small amounts of gas.

Most well locations with Paleozoic targets in Eagle Plain have been drilled along the crestal regions of Laramide anticlines (e.g., Canoe Anticline; Davidson, 1994; Dixon, 1992). However, if lower Paleozoic source rocks passed through the 'oil window' before the end of Mesozoic time, as suggested by Link and Bustin (1989), then the most effective hydrocarbon reservoirs and traps may have formed before Tertiary time, during the time of active oil migration. Post-Mesozoic traps could only serve to gather the smaller amounts of hydrocarbons generated by lower Paleozoic source rocks in their later stages of gas generation.

Several such pre-Tertiary reservoir and trap associations may have been favourable for the accumulation of liquid hydrocarbons during late Paleozoic to Mesozoic time. Certainly, the lower Paleozoic carbonate to shale transition bordering Richardson and Blackstone troughs is favourable, in general, for the entrapment of hydrocarbons in pre-Laramide, combined structural and stratigraphic traps. In another, less well known type of play, Davidson (1994) described pre-Laramide, long-wavelength anticlines involving lower Paleozoic strata in the subsurface of south-central Eagle Plain. It is possible that these anticlines entrapped hydrocarbons generated from lower Paleozoic source rocks prior to Laramide deformation.

The occurrence of dolomitized and fractured Ogilvie in the Inexco Husky et al. Porcupine YT G-31 well may indicate the presence of a pre-Laramide stratigraphic type of play similar to the Manetoe Dolomite of the Liard Basin in the southeastern Yukon (Morrow and Cook, 1987). In this type of play, tight Ogilvie limestones were fractured and dolomitized by coarsely crystalline white dolomite in late Paleozoic time, before oil generation and migration occurred, forming a mass of dolomite with enhanced vertical permeability. Where these dolomitized masses, which are encased in tight limestone, were in stratigraphic contact with the overlying and laterally adjacent Canol shale there may have been some potential for hydrocarbon migration. An obvious time for late-stage dolomitization of Ogilvie strata was during the Ellesmerian Orogeny of the late Paleozoic, which coincided with the emplacement of a number of Devonian igneous intrusions immediately north of the study area, several of which are Late Devonian in age (Norris, 1985). It is also possible that the igneous dyke that intruded Cambro-Ordovician Jones Ridge Limestone in Section 21 (Fig. 33) is another example of an intrusion related to the Ellesmerian Orogeny.

There are no operating mines in the study area, but there are numerous mineral deposits or showings (Dawson, 1984). A short summary of some of these mineral shows is also given in Norris (1985). Most mineral deposits within lower Paleozoic strata of the study area fall in and around the Misty Creek Embayment. These include the stratiform and shale-hosted Dab, Vertebra and Neco zinc and lead deposits, and the Cab lead–zinc–silver deposit. One notable stratiform lead–zinc–silver deposit, the Flunk MST deposit, occurs at the south end of Richardson Trough (Dawson, 1984). The zinc, strontium and barium background concentrations of

Road River shale in the study area are higher than is typical for shales. There may be some potential for other shale-hosted zinc–lead deposits in this region.

Apart from shale-hosted deposits there are some large vein-type deposits hosted in lower Paleozoic strata. The Arc lead–zinc–silver deposit is a large vein-type deposit in the Misty Creek Embayment. Far to the northwest, in the Porcupine River map area (116J and 116K, E1/2), is the Rusty Springs lead–zinc–silver–copper deposit, which is hosted primarily within the Ogilvie Formation. The host rock of this deposit is similar to the fractured and dolomitized Ogilvie in the Inexco Husky et al. Porcupine YT G-31 well (Fig. 59; Kirker, 1982). The existence of several sites where Ogilvie limestone has undergone postlithification fracturing and probable hydrothermal dolomitization may indicate the existence of other deposits similar to Rusty Springs.

CONCLUSIONS AND RECOMMENDATIONS

Several changes have been made to the existing stratigraphic nomenclature of the lower Paleozoic of the northern part of the Yukon Territory and adjoining parts of the District of Mackenzie, N.W.T. A new formation, the Bouvette Formation, has been erected to embrace the strata formerly included in the ЄDb map unit (Norris, 1985a). Another new formation, the Mount Dewdney Formation, has been erected to include strata formerly included in the "Kutchin Formation" of Norris (1985), in the region of the Dave Lord High at and around Mount Burgess in the Porcupine River map area (116J and 116K, E1/2), because of their distinctive bright yellow and orange, silty, tidal flat dolostones and because of their stratigraphic position directly overlying the sub-Devonian unconformity across the Dave Lord High. The "Kutchin Formation" itself is not used here because it includes strata of distinctly different lithologies at different places that are best regarded as belonging to separate formations. This unit should probably be abandoned.

The lithostratigraphic information of this study has confirmed the use of a separate stratigraphic nomenclature for lower Paleozoic strata west of Richardson Trough, as proposed originally by Norris (1968a, b). The westward extension of lower Paleozoic nomenclature from the Mackenzie Mountains into the northern Yukon Territory, as advocated by Pugh (1983) is not supported by the data of this study. The absence across the entire northern Yukon, or Yukon Stable Block of the Middle Ordovician unconformity, which in the MacKenzie Mountains separates Mount Kindle strata from underlying Franklin Mountain strata, is a fundamental distinction that can't be ignored. In addition, the presence of Road River strata as a tongue of variable thickness extending across almost the entire area of the Yukon Stable Block has no counterpart in strata of the Mackenzie–Peel Shelf. These fundamental differences can't be disregarded and the Ronning Group is therefore confined to the Mackenzie–Peel Shelf, east of Richardson Trough (Fig. 5).

Similarly, the Silurian and Lower Devonian sequence of the Road River, Michelle and Ogilvie formations of northern Yukon Territory bears little similarity to the Peel, Tatsieta, Arnica, Landry and Hume formations of the Mackenzie–Peel Shelf. The yellow and orange, peritidal, silty limestones of the Tatsieta are not comparable lithologically or sedimentologically to the brown and grey, shaly fossiliferous lime mudstones and wackestones of the Michelle Formation. Also, the Silurian to lowermost Devonian Road River basinal shales found across most of the Yukon Stable Block have no counterpart in the time-equivalent strata of the Mackenzie–Peel Shelf. And the uniform transgressive sedimentary package of the Ogilvie Formation is unlike the the time-equivalent Arnica, Landry and Hume sequence, which are dominantly regressive high-stand sedimentary wedges that prograded westward. As well, the sub-Devonian unconformity, which is present across the entire Mackenzie–Peel Shelf, is absent across most of the Yukon Stable Block. There is no basis for extending the Peel, Tatsieta, Arnica, Landry, and Hume formations westward across Richardson Trough. The existence of the Michelle and Ogilvie formations (Norris, 1985) as lithologically homogeneous and mappable units in both outcrop and the subsurface is reaffirmed in this study.

The Yukon Stable Block was characterized by a much smaller proportion of peritidal, shallow-water sedimentation than was the Mackenzie–Peel Shelf in early Paleozoic time. It seems possible that some tectonic decoupling took place, so that uplifts affecting the Mackenzie–Peel Shelf were not transmitted to the Yukon Stable Block. High-angle faults flanking Richardson Trough and the Knorr Block may have been active during early Paleozoic time and possibly were responsible for this decoupling.

The development of unconformities within the Yukon Stable Block sequence provides a means of testing the putative eustatic origin of second- and third-order cycles of sea-level change (Vail et al., 1977). If they had a global eustatic origin, the unconformities that are so strongly developed across the Mackenzie–Peel Shelf, and indeed across the rest of continental North America, should also be found within the large, isolated, shallow-water carbonate platforms that developed offshore of the continental shelf margin. The Yukon Stable Block was itself a large, offshore isolated platform and contains other, smaller isolated platforms that provide a testing ground for the eustatic origin of early Paleozoic sea-level changes.

The fact that the mid-Ordovician unconformity is not developed in shallow-water carbonates of the Bouvette

Formation in the Yukon Stable Block may indicate that this unconformity is primarily due to a relative change of sea-level that accompanied tectonic uplift of the Mackenzie–Peel Shelf relative to the Yukon Stable Block, in early to mid-Ordovician time. A similar explanation may be applied to explain the relative absence of the sub-Devonian unconformity across the Yukon Stable Block. This suggests, in turn, that early Paleozoic second-order cycles of sea-level change are primarily due to tectonically imposed relative sea-level changes, rather than eustacy.

Unlike second-order cycles of sea-level changes, early Paleozoic third-order cycles of sea-level change documented from continental lower Paleozoic strata are also expressed in the stratigraphy of the Yukon Stable Block. Periods of regression on Mackenzie–Peel Shelf, such as the pre-Hume regression and the Hume regression itself, were expressed as times of more pronounced vertical aggradation during Ogilvie deposition on the Yukon Stable Block (Fig. 62). Conversely, periods of transgression and flooding of Mackenzie–Peel Shelf are matched by a less aggradational, more transgressive style of sedimentation in the Ogilvie Formation. The differences in the manner in which these third-order sea-level cycles are expressed in these areas may be because the third-order eustatic sea-level changes are superimposed on a background of second-order relative changes in sea level that differed in magnitude between the Mackenzie–Peel Shelf and the Yukon Stable Block.

In terms of hydrocarbon potential, lower Paleozoic strata in the study area are mainly prospective for gas, with potential reservoir rock primarily within the Ogilvie and Bouvette formations. The Ogilvie Formation is overmature throughout most of southern Eagle Plain, but there is a small region in the extreme southwest part where it may be at or near the base of the 'oil window' (Fig. 60). The probability that hydrocarbon migration occurred in late Paleozoic to early Mesozoic time because of oil generation from organic-rich Canol shales in Devono-Carboniferous time (Link and Bustin, 1989) implies that the most effective trapping situations were those that developed prior to the Laramide Orogeny and not affected by Laramide deformation. One possible trap type may be the masses of dolomitized Ogilvie limestone that underwent fracturing and hydrothermal dolomitization possibly in late Paleozoic time. This may be analogous to the trap type of the gas fields of the Liard Basin in southeastern Yukon Territory developed in the Manetoe Dolomite, an upper Paleozoic hydrothermal dolomite (Morrow and Cook, 1987; Morrow et al., 1990). Another possible pre-Laramide trap type occurs as long wavelength anticlines in the subsurface of western Eagle Plain (Davidson, 1994). Also, pre-Laramide entrapment of hydrocarbons may have occurred in more porous shelf-margin carbonate facies developed near Richardson and Blackstone troughs.

This study could form part of a more integrated basin analysis of the Eagle Plain Basin. More detailed lithostratigraphic analysis of the upper Paleozoic sequence in the subsurface of Eagle Plain and in the surrounding outcrop belts is essential for this purpose. Upper Paleozoic strata contain the most prolific hydrocarbon source rocks as well as a commercial-grade oil pool in the Chance Sandstone of the Hart River Formation (Davidson, 1994; Link et al., 1989). Assessment of the resource potential of Eagle Plain Basin must include more detailed lithostratigraphic and biostratigraphic studies to outline the occurrence of more favourable reservoir facies and possible times of hydrocarbon entrapment.

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Appendix 1
Outcrop section locations and formation thicknesses (m)

Section	Section name	Latitude	Longitude	Total thickness	Canol Fm	Canol Fm (l)	Ogilvie Fm	Ogilvie Fm (l)	Dolomite Mbr	Mount Dewdney Fm	Michelle Fm	Michelle Fm (l)	Road River Fm-Gp	Road River Fm-Gp (l)	Bouvette Fm	Bouvette Fm (l)
1	MTA-82-7	64.4297	132.8481	1586.0									442.5			
2	MTA-85-1	64.5250	134.9500	835.0		2.5		832.5	549.0							
3	MTA-84-11	64.5833	135.2917	712.0		1.5		710.5	710.5							
4	MTA-86-5	64.6250	139.1833	559.0												432.0
5	MTA-82-17	64.6500	132.7833	1368.0												1368.0
6	MTA-84-12	64.7917	135.3697	1140.0	75.0		45.0						567.0			453.0
7	MTA-86-25	64.8750	139.5333	1207.0										20.0	987.0	
8	MTA-82-1	65.0417	135.0833	967.0									164.0			803.0
9	MTA-82-13	65.0547	135.1542	784.5		50.0							658.0			76.5
10	MTA-86-P1	65.0583	138.5667	75.0			25.0							50.0		
11	MTA-86-15	65.0750	136.2500	1200.0											920.0	
12	MTA-86-8	65.0917	138.4000	263.0		20.0								243.0		
13	MTA-82-2	65.1222	135.6667	442.5										70.0		372.5
14	MTA-82-16	65.1283	136.6483	760.0										721.0		39.0
15	MTA-86-4	65.1667	137.7167	432.0			198.0		78.0							234.0
16	MTA-82-15	65.1889	136.2500	1171.0										495.0		696.0
17	MTA-85-2	65.1917	136.6667	741.5										704.0		37.5
18	MTA-86-10	65.2000	139.0583	884.0											784.0	
19	MTA-82-6	65.2167	132.2667	1061.5												
20	MTA-86-21	65.2250	137.9333	365.0			70.0							295.0		
21	MTA-86-28	65.2750	140.9167	530.0												470.0
22	MTA-82-5	65.3750	134.1667	650.5			124.0						526.5			
23	MTA-82-14	65.3833	136.2167	447.0	57.0		81.0						225.0			84.0
24	MTA-86-7	65.3833	138.2417	963.0			240.0				123.0		174.0			426.0
25	MTA-86-12	65.3917	140.3000	472.0				114.0					54.0		294.0	
26	MTA-86-P2	65.4000	140.1000	180.0			110.0							70.0		
27	MTA-82-11	65.4122	131.8178	1415.0												
28	MTA-84-8	65.4167	137.0500	506.5			437.5				69.0					
29	MTA-84-9	65.4333	136.9667	311.5			213.5		60.0		98.0					
30	MTA-82-4	65.4500	133.8833	748.5												
31	MTA-86-19	65.4500	139.4167	637.0			604.0		250.0			33.0				
32	MTA-82-8	65.4528	133.5833	448.0									90.0			
33	MTA-86-22	65.4542	140.7917	365.0				365.0								
34	MTA-84-10	65.4583	136.9500	164.0			159.0		45.0			5.0				
35	MTA-86-3	65.4583	137.2667	1931.0												1345.0
36	MTA-86-11	65.4583	139.4583	1573.0			448.0		307.0		114.0		117.0		864.0	
37	MTA-86-9	65.4667	138.2250	836.0			733.0		396.0		57.0			46.0		
38	MTA-86-1	65.4833	137.9583	1068.0			924.0		495.0		144.0					
39	MTA-86-6	65.3667	138.4583	876.0			606.0				69.0		201.0			
40	MTA-86-13	65.4833	139.1500	803.0			677.0						126.0			
41	MTA-82-3	65.5083	133.0500	469.0												
42	MTA-86-2	65.5167	137.6917	1957.0			773.0		369.0		93.0		100.0			981.0
43	MTA-86-14	65.5583	138.7833	756.0			726.0		345.0					30.0		
44	MTA-82-9	65.5744	132.7761	687.5												
45	MTA-82-10	65.5767	135.1875	838.0												838.0
46	MTA-86-P4	65.5958	140.5667	210.0			50.0							160.0		
47	MTA-84-4	65.6333	136.7250	543.0			275.0				168.0			100.0		
48	MTA-84-3	65.6500	136.7667	572.0			275.0				223.5			114.0		
49	MTA-84-5	65.6500	136.8083	406.5			301.0		115.0		105.5					
50	MTA-84-2	65.6667	137.2000	1761.5				861.5	455.0		105.0		290.0			405.0
51	MTA-84-6	65.6711	136.8542	521.0			419.0		178.0		102.0					
52	MTA-84-7	65.6814	137.0114	703.5				568.5	334.0		64.5			70.0		
53	MTA-84-1	65.6833	137.4333	1150.0			1077.5		334.5		72.5					
54	MTA-86-26	65.6917	139.6000	556.0	240.0		201.0						115.0			
55	MTA-86-16	66.0167	139.6000	962.0						40.0					902.0	
56	MTA-86-17	66.0500	139.5917	939.0			858.0			81.0						
57	MTA-82-12	66.4122	135.4767	946.0	220.0									726.0		

Appendix 1 (cont.)
Outcrop section locations and formation thicknesses (m)

Hume Fm (l)	Mount Baird Fm	Landry Fm	Landry Fm (l)	Arnica Fm	Arnica Fm (l)	Tatsieta Fm	Peel Fm	Delorme Fm-Gp	Delorme Fm-Gp (l)	Mount Kindle Fm	Mount Kindle Fm (l)	Franklin Mnt Fm	Taiga Fm	Illtyd Fm	Slats Creek Fm	Precambrian
										120.0		636.0				387.5
																127.0
																200.0
													18.0		12.0	250.0
																100.0
20.0		230.0		171.0		72.0	336.5	408.5			232.0					
																60.0
																10.0
			70.0	113.0		124.0	63.0	187.0		254.0		663.5				27.5
						165.0	205.5	370.5		378.0						
30.0	326.0				20.0											
													96.0		500.0	
																30.0
	58.0			376.0					35.0							
										312.0		375.5				
																20.0

Appendix 2
List of wells in study region and basic data for these wells

Short name	Unique well ID	KB elevation (m)	Rig date	Original status[1]	Current status[2]	Original units	Full name	Total depth	Latitude	Longitude	Grid elevation
Cranswick A-22	300A226540131450	768.4	720328	WFDA	DA	B	Amoco PCP A-1 Cranswick A-22	2869.1	65.5169	131.8153	762
Cranswick A-42	300A426550133000	620	730320	WFDA	DA	B	Amoco PCP B-1 Cranswick YT A-42	4267.2	65.6868	133.1311	613.3
Blackstone D-77	300D776550137000	645	630108	WFDA	DA	B	SOBC Blackstone YT D-77	4028.5	65.7697	137.2486	640.1
Mallard O-18	300O186550140150	1117.1	720819	WFDA	DA	B	Inexco et al. Mallard YT O-18	3200.1	65.7994	140.2947	1112.5
Alder C-33	300C336600136450	530	790304	WFDA	DA	M	Aquitaine Alder YT C-33	3714	65.8671	136.9194	523.6
South Chance D-63	300D636600137300	707.4	720501	WFDA	DA	B	Chev SOBC Imp South Chance YT D-63	2020.8	65.8692	137.7142	701
South Peel D-64	300D646600132150	558.1	740315	WFDA	DA	B	Dome Texaco Imp South Peel D-64	1985.5	65.8844	132.4639	553.2
Taylor Lake K-15	300K156600133000	468.8	690329	WFDA	DA	B	MCD GCO Northrup Taylor Lake YT K-15	2378.7	65.9108	133.0500	464.8
Blackfly M-55	300M556600140150	755	700401	WFDA	DA	B	INC Husky Amoco Blackfly YT M-55	2069.6	65.9153	140.4319	749.8
Peel River N-77	300N776600134151	148.4	700723	WFDA	DA	B	Toltec Peel River YT N-77	1122.6	65.9461	134.4867	146.3
Whitestone N-58	300N586600138150	889.4	730417	WFDA	DA	B	Murphy Mesa Pb Whitestone YT N-58	2131.5	65.9639	138.4250	886.1
Blackie M-59	300M596600137000	562.1	640327	WFGE	GE	B	Socony Mobil-Wm Blackie YT #1 M-59	1931.8	65.9819	137.1864	557.5
Birch E-53	300E536610136450	621.5	720221	WFDA	DA	B	Chevron SOBC Wm Birch YT E-53	684.3	66.0392	136.9347	617.2
East Porcupine I-13	300I136610137450	507.5	710502	WFDA	DA	B	SOBC Wm East Porcupine YT I-13	2439.3	66.0431	137.7828	501.4
Birch B-34	300B346610136450	667.5	650608	WFGE	GE	B	Socony Mobil - WM BirchYT B-34	1649.9	66.0509	136.8549	663.5
Weldon Creek O-65	300O656610132150	222.8	730412	WFDA	DA	B	Inexco et al. Weldon Creek O-65	2214.4	66.0792	132.4503	218.8
Porcupine River K-56	300K566610137450	498	630723	WFDA	DA	B	Socony Mobil-Wm Porcupine R YT K-56	2286	66.0926	137.9256	494.1
Whitestone N-26	300N266610138150	696.5	640806	WFDA	DA	B	Socony Mobil et al. Whitestone N-26	2464.3	66.0997	138.3333	691.3
East Chance C-18	300C186610137150	535.2	680406	OPDA	DA	B	Canoe River East Chance YT C-18	1540.8	66.1192	137.2993	531.3
Chance G-08	300G086610137300	524.3	650218	OPOE	OE	B	Socony Mobil - Wm Chance YT G-08	1579.8	66.1217	137.5139	518.8
East Porcupine F-18	300F186610137450	523	720501	WFDA	DA	B	Chevron SOBC Wm E Porcupine YT F-18	2050.7	66.1236	137.8044	518.5
Chance L-08	300L086610137300	539.2	590525	WFGOE	GOE	B	Western Minerals Chance YT #1 L-08	2635.9	66.1283	137.5283	534
Chance J-19	300J196610137300	518.8	680217	OPGE	GE	B	Canoe River Chance YT J-19	1446.3	66.1420	137.5411	514.2
Peel River M-69	300M696610133450	291.7	741204	WFDA	DA	B	Shell Peel River YT M-69	3272.6	66.1489	133.9678	282.5
West Parkin D-51	300D516620137150	475.5	650403	WFDA	DA	B	Socony Mobil-Wm West Parkin YT D-51	1508.8	66.1690	137.4346	470.6
Peel River I-21	300I216620134150	381.3	660330	WFDA	DA	B	Shell Peel River YT I-21	2072.6	66.1768	134.3142	377.3
North Chance D-22	300D226620137300	536	850408	WFDA	DA	M	Exco et al. North Chance D-22	1830	66.1850	137.5925	531.5
N Cathedral B-62	300B626620138300	540.1	650626	WFT	T	B	Socony Mobil-Wm N Cathedral YT B-62	2138.5	66.1871	138.6981	534.9
West Parkin C-33	300C336620137150	520	720115	WFDA	DA	B	Chevron Sobc Wm West Parkin YT C-33	1256.7	66.2011	137.3656	514.5
D-54/66-20-137-15	300D546620137150	506.8	841220	WFA	A	M	Exco et al. West Parkin D-54	1811	66.2188	137.4336	502.5
Caribou N-25	300N256620134450	495.3	740810	WFDA	DA	B	Gulf Mobil Caribou YT N-25	3600.3	66.2461	134.8344	487.7
Sainville River D-08	300D086620133300	203	740306	WFDA	DA	B	Arco Shell Sainville River D-08	2651.8	66.2853	133.5275	198.1
Ontaratue I-38	300I386620131450	144.5	721106	WFDA	DA	B	Decal Tran Ocean Exco Ontaratue I-38	2287.5	66.2944	131.8500	138.7
Peel River K-09	300K096620134000	349.6	670307	WFDA	DA	B	Shell Peel River YT K-09	1554.5	66.3099	134.0173	345.6
North Parkin D-61	300D616630137000	489.2	720506	WFDA	DA	B	Chevron SOBC Wm North Parkin YT D-61	3352.8	66.3367	137.2169	483.1
Porcupine G-31	300G316630140000	922	720324	WFDA	DA	B	Inexco Husky et al. Porcupine YT G-31	2657.9	66.3394	140.1036	917.4
Peel H-71	300H716630134300	513	770612	WFDA	DA	B	Mobil Gulf Peel YT H-71	3392.1	66.3411	134.7261	506.3
Sainville River K-63	300K636630133000	138.7	720123	WFDA	DA	B	Shell Sainville River K-63	790	66.3769	133.2043	133.8
Ontaratue H-34	300H346630132000	141.7	640401	WFDA	DA	B	Atlantic et al. Ontaratue H-34	4075.2	66.3896	132.0976	137.2
South Tuttle N-05	300N056630136450	504.7	650708	WFDA	DA	B	Socony Mobil-Wm South Tuttle YT N-05	3513.4	66.4142	136.7730	500.5
Peel River K-76	300K766630134000	76.5	651125	WFDA	DA	B	Shell Peel River YT K-76	1386.8	66.4265	134.2355	72.5
Peel River J-21	300J216640134000	45.7	650901	WFDA	DA	B	Shell Peel River YT J-21	1219.2	66.5089	134.0731	41.8
Peel River L-01	300L016640134450	394.7	660207	WFDA	DA	B	Shell Peel River YT L-01	1834.9	66.5106	134.7746	390.8
North Hope N-53	300N536640138150	350.5	700813	WFDA	DA	B	Western Minerals North Hope YT N-53	4280.3	66.5483	138.4250	346.3
Ellen C-24	300C246640137450	414.5	650403	WFDA	DA	B	Socony Mobil - Wm Ellen YT C-24	2174.4	66.5525	137.8356	410
Peel River B-06	300B066640134450	65.2	661231	WFDA	DA	B	Shell Peel River YT B-06	1066.8	66.5859	134.7604	61.6
Peel River B-06A	302B066640134450	66.4	670125	WFDA	DA	B	Shell Peel River YT B-06A	1066.8	66.5860	134.7611	62.5
Trail River H-37	300H376640134450	393.2	740326	WFDA	DA	B	Shell Peel River YT H-37	3721.6	66.6044	134.8497	385.3
Peel River H-59	300H596640134300	33.5	670401	WFDA	DA	B	Shell Peel River YT H-59	763.2	66.6383	134.6592	29.6
Shaeffer Creek O-22	300O226650137150	352	710509	WFDA	DA	B	SOBC Wm Shaeffer CK YT O-22	3161.7	66.6983	137.3278	347.2
Arctic Red West G-55	300G556650133000	44.5	710522	WFDA	DA	B	Shell Arctic Red West G-55	3322.3	66.7412	133.1662	39.3
Arctic Red R O-27	300O276650132450	136.6	710123	WFDA	DA	B	Shell Arctic Red River O-27	2154	66.7822	132.8266	131.7
Peel River L-19	300L196650135150	95.1	660612	WFDA	DA	B	Shell Peel River YT L-19	1981.2	66.8109	135.3066	91.4
Eagle Plains N-49	300N496650138000	447.8	580715	WFDA	DA	B	Peel Plat Eagle Plains YT #1 N-49	2922.7	66.8150	138.1417	444.1
Arctic Red C-60	300C606650133450	92	720326	WFDA	DA	B	Skelly-Getty Mobil Arctic Red C-60	2599.9	66.8167	133.9219	86.9
Martin House L-50	300L506650133150	88.1	660611	WFDA	DA	B	IOE Martin House L-50	2407.9	66.8283	133.4008	83.8
Satah River G-72	300G726700134000	89.6	670309	WFDA	DA	B	IOE Satah River YT G-72	2286	66.8578	134.2325	86

Appendix 2 (cont.)
List of wells in study region and basic data for these wells

Short name	Unique well ID	KB elevation (m)	Rig date	Original status[1]	Current status[2]	Original units	Full name	Total depth	Latitude	Longitude	Grid elevation
Peel F-37	300F376700134450	54.6	720420	WFDA	DA	B	Pacific et al. Peel YT F-37	3368	66.9406	134.8650	48.8
East Pine Creek O-78	300O786700137450	389.2	720126	WFDA	DA	B	Chevron SOBC Wm East Pine CK YT O-78	947.6	66.9647	137.9828	384.4
Molar P-34	300P346710138300	803.5	640813	WFDA	DA	B	Socony Mobil - Wm Molar YT P-34	2649.6	67.0664	138.6000	799.2
Whitefish I-05	300I056710137150	348.1	730330	WFDA	DA	B	Chevron SOBC Wm Whitefish YT I-05	1498.4	67.0769	137.2569	342.3
Tree River East H-57	300H576710132150	108.2	710317	WFDA	DA	B	Shell Tree River East H-57	1981.2	67.1075	132.4112	103.3
Tree River F-57	300F576710132150	93	701212	WFDA	DA	B	Shell Tree River F-57	1979.7	67.1076	132.4279	88.1
Swan Lake K-28	300K286710133300	89.6	670302	WFDA	DA	B	IOE Swan Lake K-28	1838.2	67.1283	133.5789	85
Clare F-79	300F796710133000	108.8	650620	WFDA	DA	B	IOE Clare F-79	2525.6	67.1389	133.2389	104.5
Whitefish J-70	300J706710137150	330.7	730410	WFDA	DA	B	Chevron SOBC Wm Whitefish YT J-70	2127.5	67.1589	137.4456	326.1
McPherson B-25	300B256720135300	492.3	730312	WFDA	DA	B	Union Amoco McPherson B-25	4136.1	67.2336	135.5729	484.6
Nevejo M-05	300M056720134000	74.4	660328	WFDA	DA	B	IOE Nevejo M-05	2378.7	67.2494	134.0292	70.4
Tree River H-38	300H386720132150	79.6	670423	WFDA	DA	B	IOE Tree River H-38	1279.2	67.2892	132.3500	75.3
Ridge F-48	300F486720137450	321.3	730402	WFDA	DA	B	Chevron SOBC Gulf Ridge YT F-48	1868.7	67.2897	137.8931	315.2
Bell River N-50	300N506720136450	317.6	600908	WFDA	DA	B	Amerada et al. Crown Bell R YT N-50	2439.6	67.3292	136.8914	313
C-2/67-30-135-30	300C026730135300	275.8	670829	Z A	A	B	IOE Stoney Core Hole C-2	176.8	67.3521	135.5195	275.8
F-42/67-30-135-30	300F426730135300	327.7	670812	Z A	A	B	IOE Stoney Core Hole F-42	310.9	67.3563	135.6445	327.7
F-52/67-30-135-30	302F526730135300	304.8	670820	Z A	A	B	IOE Stoney Core Hole F-52A	305.7	67.3563	135.6758	304.8
Attoe Lake I-06	300I066730133150	86.3	691216	WFDA	DA	B	INC NCO Mobil Attoe Lake I-06	2257	67.4250	133.2528	83.2
Stony I-50	300I506730135150	321.9	660508	WFDA	DA	B	IOE Stony I-50	3343	67.4956	135.3794	317.3
Fort McPherson N C-78	300C786740134000	19.8	720717	WFDA	DA	B	Skelly-Getty Amoco Ft McPherson C-78	3068.1	67.5178	134.2389	15.8
North Porcupine N-72	300F726740137450	349.3	740406	WFDA	DA	B	Westcoast el al. N Porcupine YT N-72	2251.9	67.5231	137.9850	344.1
Point Separation #1	300A056740134000	18.9	601016	WFDA	DA	B	Richf et al. Pt Separation #1 A-05	2445.4	67.5683	134.0028	15.2
Stony G-06	300G066740135150	56.7	730217	WFDA	DA	B	Dome Union IOE Stony G-06	2529.8	67.5911	135.2639	51.8
South Delta J-80	300J806740134300	15.2	730223	WFDA	DA	B	Bluemont et al. Gulf S DELTA J-80	2895.6	67.6612	134.7273	11.3

[1]Original status: WFDA - water standing, dry; OPDA - oil producer, dry and abandoned; OPGE - oil producer, gas and abandoned; OPOE - oil producer, oil suspended; WFGOE - water standing, gas and oil suspended; WFT - water standing temperature; WFA - water standing abandoned; ZA - abandoned zone

[2]Current status: DA - dry and abandoned; GE - gas, suspended; GOE - gas and oil, suspended; OE - oil, suspended; T - temperature; A - abandoned

Appendix 3
Subsurface well section lower Paleozoic formation tops

Appendix 3A
Formation tops (feet) - revised

Short name	Unique well ID	Latitude	Longitude	KB elev (m)	KB elev (ft.)	Grid elev (m)	Grid elev (ft.)	Depth (ft.)	Canol Fm	Bluefish Mbr	Hume Fm	Ogilvie Fm	Dolomite Mbr	Mount Dewdney Fm	Michelle Fm
Alder C-33	300C336600136450	65.8671	136.9194	530	1739	523.6	1718	12185	9032			9380	10827		
Arctic Red C-60	300C606650133450	66.8167	133.9219	92	302	86.9	285	8530	5340		5488				
Arctic Red R O-27	300O276650132450	66.7822	132.8266	136.6	448	131.7	432	7067	3300		3518				
Arctic Red West G-55	300G556650133000	66.7412	133.1662	44.5	146	39.3	129	10900	3620		3815				
Attoe Lake I-06	300I066730133150	67.4250	133.2528	86.3	283	83.2	273	7405	3580		3755				
Blackstone D-77	300D776550137000	65.7697	137.2486	645	2116	640.1	2100	13217	3555			3613	5750		7150
Caribou N-25	300N256620134450	66.2461	134.8344	495.3	1625	487.7	1600	11812	4515						
Clare F-79	300F796710133000	67.1389	133.2389	108.8	357	104.5	343	8286	3650		3928				
Cranswick A-22	300A226540131450	65.5169	131.8153	768.4	2521	762	2500	9413	3570	3810	3850				
Cranswick A-42	300A426550133000	65.6868	133.1311	620	2034	613.3	2012	14000	6900	7062	7088				
Eagle Plains N-49	300N496650138000	66.8150	138.1417	447.8	1469	441.1	1447	9589	3541			3592	5575	5935	
Martin House L-50	300L506650133150	66.8283	133.4008	88.1	289	83.8	275	7900	4275	4450	4467				
McPherson B-25	300B256720135300	67.2336	135.5729	492.3	1615	484.6	1590	13570	9560		9620				
N Cathedral B-62	300B626620138300	66.1871	138.6981	540.1	1772	534.9	1755	7016	2495			2661	4200		4760
Nevejo M-05	300M056720134000	67.2494	134.0292	74.4	244	70.4	231	7804	5456		5565				
North Hope N-53	300N536640138150	66.5483	138.4250	350.5	1150	346.3	1136	14043	5980			6061	7500	8370	
North Parkin D-61	300D616630137000	66.3367	137.2169	489.2	1605	483.1	1585	11000	7312			7476	9952		
Ontaratue H-34	300H346630132000	66.3896	132.0976	141.7	465	137.2	450	13370	2920	3188	3227				
Ontaratue I-38	300I386620131450	66.2944	131.8500	144.5	474	138.7	455	7505	2920	3210	3232				
Peel F-37	300F376700134450	66.9406	134.8650	54.6	179	48.8	160	11050	7410		7505				
Peel H-71	300H716630134300	66.3411	134.7261	513	1683	506.3	1661	11129	5930						
Peel River I-21	300I216620134150	66.1768	134.3142	381.3	1251	377.3	1238	6800	4620						
Peel River M-69	300M696610133450	66.1489	133.9678	291.7	957	282.5	927	10737	7450		7545				
Porcupine G-31	300G316630140000	66.3394	140.1036	922	3025	917.4	3010	8720	3200			4095		5545	
Sainville River D-08	300D086620133300	66.2853	133.5275	203	666	198.1	650	8700	5482	5678	5693				
Satah River G-72	300G726700134000	66.8578	134.2325	89.6	294	86	282	7500	5995	6140	6151				
Shaeffer Creek O-22	300O226650137150	66.6983	137.3278	352	1155	347.2	1139	10373	8310			8328	10090		
South Peel D-64	300D646600132150	65.8844	132.4639	558.1	1831	553.2	1815	6514	4902	5100	5120				
South Tuttle N-05	300N056630136450	66.4142	136.7730	504.7	1656	500.5	1642	11527	4500			4723	7130		8550
Stony I-50	300I506730135150	67.4956	135.3794	321.9	1056	317.3	1041	10968	6940		7157				
Swan Lake K-28	300K286710133300	67.1283	133.5789	89.6	294	85	279	6031	4462		4671				
Taylor Lake K-15	300K156600133000	65.9108	133.0500	468.8	1538	464.8	1525	7804	4298	4440	4452				
Trail River H-37	300H376640134450	66.6044	134.8497	393.2	1290	385.3	1264	12210	8860		8875				
Tree River East H-57	300H576710132150	67.1075	132.4112	108.2	355	103.3	339	6500	2362	2605	2640				
Tree River F-57	300F576710132150	67.1076	132.4279	93	305	88.1	289	6495	2309		2570				
Tree River H-38	300H386720132150	67.2892	132.3500	79.6	261	75.3	247	4197	2400		2550				
Weldon Creek O-65	300O656610132150	66.0792	132.4503	222.8	731	218.8	718	7265	4108	4300	4333				

Appendix 3A (cont.)
Formation tops (feet) - revised

Landry Fm	Arnica Fm	Tatsieta Fm	Peel Fm	Delorme Gp (Fm)	Road River Gp (Fm)	Bouvette Fm	Mt Kindle Fm	Loucheux Fm	Franklin Mtn Fm	Slats Creek Fm	Saline River Fm	Mt Cap Fm	Mt Clark Fm	Proterozoic	Tsezotene Fm	Map Unit #1
5825	6560	7543	7646	7543												
3853	4580	5390	5437	5390			6292									
4166	4955	5748	5871	5748			6772		8225			10780	10829			
4025	4980	5605	5716	5605			6385									
					7650	9276										
					5210			7370	9262	11261						
4243	5000	6052	6162	6052			6957		8150							
4317	5075	5730	5890	5730			6540		7190					9330		
7640	9745	9995	10255	9995			10990		12098							
						6526										
4807	5520	6552	6650	6552			7495									
	9975	11300	11652	11300			12380		13098							
					5707	6188										
5860	6805	7555	7700	7555												
						8961										
3615	4370	5220	5390	5220			6025		7020		9460	9590	9900		10204	13072
3609	4400	5160	5350	5160			5934		6950							
7849	8792	9668	9793	9668			10913									
					6190		8932		9855							
					4760											
7975	8720	10028	10195	10028												
						5730								8284		
6180	7947	8026	8170	8026												
6500	7210															
5585	6350															
					8753	9412										
7352					7930		8880		9822							
4975	5910															
5000	5778	6550	6750	6550			7600									
9160	11300	11440	11520	11440												
2964	3805	4600	5235	4600			5605									
2884	3670	4460	5010	4460			5438									
2595	3460															
4790	5500	6612	6670	6612												

Appendix 3B
Formation tops (metres)

Short name	Unique well ID	Latitude	Longitude	KB elev (m)	KB elev (ft.)	Grid elev (m)	Grid elev (ft.)	Depth (m)	Canol Fm	Bluefish Mbr	Hume Fm	Ogilvie Fm	Dolomite Mbr	Mount Dewdney Fm	Michelle Fm
Alder C-33	300C336600136450	65.8671	136.9194	530	1739	523.6	1718	3714.0	2753.0			2859.0	3300.1		
Arctic Red C-60	300C606650133450	66.8167	133.9219	92	302	86.9	285	2599.9	1627.6		1672.7				
Arctic Red R O-27	300O276650132450	66.7822	132.8266	136.6	448	131.7	432	2154.0	1005.8		1072.3				
Arctic Red West G-55	300G556650133000	66.7412	133.1662	44.5	146	39.3	129	3322.3	1103.4		1162.8				
Attoe Lake I-06	300I066730133150	67.4250	133.2528	86.3	283	83.2	273	2257.0	1091.2		1144.5				
Blackstone D-77	300D776550137000	65.7697	137.2486	645	2116	640.1	2100	4028.5	1083.6			1101.2	1752.6		2179.3
Caribou N-25	300N256620134450	66.2461	134.8344	495.3	1625	487.7	1600	3600.3	1376.2						
Clare F-79	300F796710133000	67.1389	133.2389	108.8	357	104.5	343	2525.6	1112.5		1197.3				
Cranswick A-22	300A226540131450	65.5169	131.8153	768.4	2521	762	2500	2869.1	1088.1	1161.3	1173.5				
Cranswick A-42	300A426550133000	65.6868	133.1311	620	2034	613.3	2012	4267.2	2103.1	2152.5	2160.4				
Eagle Plains N-49	300N496650138000	66.8150	138.1417	447.8	1469	441.1	1447	2922.7	1079.3			1094.8	1699.3	1809.0	
Martin House L-50	300L506650133150	66.8283	133.4008	88.1	289	83.8	275	2407.9	1303.0	1356.4	1361.5				
McPherson B-25	300B256720135300	67.2336	135.5729	492.3	1615	484.6	1590	4136.1	2913.9		2932.2				
N Cathedral B-62	300B626620138300	66.1871	138.6981	540.1	1772	534.9	1755	2138.5	760.5			811.1	1280.2		1450.8
Nevejo M-05	300M056720134000	67.2494	134.0292	74.4	244	70.4	231	2378.7	1663.0		1696.2				
North Hope N-53	300N536640138150	66.5483	138.4250	350.5	1150	346.3	1136	4280.3	1822.7			1847.4	2286.0	2551.2	
North Parkin D-61	300D616630137000	66.3367	137.2169	489.2	1605	483.1	1585	3352.8	2228.7			2278.7	3033.4		
Ontaratue H-34	300H346630132000	66.3896	132.0976	141.7	465	137.2	450	4075.2	890.0	971.7	983.6				
Ontaratue I-38	300I386620131450	66.2944	131.8500	144.5	474	138.7	455	2287.5	890.0	978.4	985.1				
Peel F-37	300F376700134450	66.9406	134.8650	54.6	179	48.8	160	3368.0	2258.6		2287.5				
Peel H-71	300H716630134300	66.3411	134.7261	513	1683	506.3	1661	3392.1	1807.5						
Peel River I-21	300I216620134150	66.1768	134.3142	381.3	1251	377.3	1238	2072.6	1408.2						
Peel River M-69	300M696610133450	66.1489	133.9678	291.7	957	282.5	927	3272.6	2270.8		2299.7				
Porcupine G-31	300G316630140000	66.3394	140.1036	922	3025	917.4	3010	2657.9	975.4			1248.2		1690.1	
Sainville River D-08	300D086620133300	66.2853	133.5275	203	666	198.1	650	2651.8	1670.9	1730.7	1735.2				
Satah River G-72	300G726700134000	66.8578	134.2325	89.6	294	86	282	2286.0	1827.3	1871.5	1874.8				
Shaeffer Creek O-22	300O226650137150	66.6983	137.3278	352	1155	347.2	1139	3161.7	2532.9			2538.4	3075.4		
South Peel D-64	300D646600132150	65.8844	132.4639	558.1	1831	553.2	1815	1985.5	1494.1	1554.5	1560.6				
South Tuttle N-05	300N056630136450	66.4142	136.7730	504.7	1656	500.5	1642	3513.4	1371.6			1439.6	2173.2		2606.0
Stony I-50	300I506730135150	67.4956	135.3794	321.9	1056	317.3	1041	3343.0	2115.3		2181.5				
Swan Lake K-28	300K286710133300	67.1283	133.5789	89.6	294	85	279	1838.2	1360.0		1423.7				
Taylor Lake K-15	300K156600133000	65.9108	133.0500	468.8	1538	464.8	1525	2378.7	1310.0	1353.3	1357.0				
Trail River H-37	300H376640134450	66.6044	134.8497	393.2	1290	385.3	1264	3721.6	2700.5		2705.1				
Tree River East H-57	300H576710132150	67.1075	132.4112	108.2	355	103.3	339	1981.2	719.9	794.0	804.7				
Tree River F-57	300F576710132150	67.1076	132.4279	93	305	88.1	289	1979.7	703.8		783.3				
Tree River H-38	300H386720132150	67.2892	132.3500	79.6	261	75.3	247	1279.2	731.5		777.2				
Weldon Creek O-65	300O656610132150	66.0792	132.4503	222.8	731	218.8	718	2214.4	1252.1	1310.6	1320.7				

Appendix 3B (cont.)
Formation tops (metres)

Landry Fm	Arnica Fm	Tatsieta Fm	Peel Fm	Delorme Gp (Fm)	Road River Gp (Fm)	Bouvette Fm	Mt Kindle Fm	Loucheux Fm	Franklin Mtn Fm	Slats Creek Fm	Saline River Fm	Mt Cap Fm	Mt Clark Fm	Proterozoic	Tsezotene Fm	Map Unit #1
1775.5	1999.5	2299.1	2330.5	2299.1												
1174.4	1396.0	1642.9	1657.2	1642.9			1917.8									
1269.8	1510.3	1752.0	1789.5	1752.0			2064.1		2507.0			3285.7	3300.7			
1226.8	1517.9	1708.4	1742.2	1708.4			1946.1									
					2331.7	2827.3										
					1588.0			2246.4	2823.1	3432.4						
1293.3	1524.0	1844.6	1878.2	1844.6			2120.5		2484.1							
1315.8	1546.9	1746.5	1795.5	1746.5			1993.4		2191.5					2843.8		
2328.7	2970.3	3046.5	3125.7	3046.5			3349.8		3687.5							
						1989.1										
1465.2	1682.5	1997.0	2026.9	1997.0			2284.5									
	3040.4	3444.2	3551.2	3444.2			3773.4		3992.3							
					1739.5	1886.1										
1786.1	2074.2	2302.8	2347.0	2302.8												
						2731.3										
1101.9	1332.0	1591.1	1642.9	1591.1			1836.4		2139.7		2883.4	2923.0	3017.5		31102.	3984.3
1100.0	1341.1	1591.1	1642.9	1591.1			1808.7		2118.4							
2392.4	2679.8	2946.8	2984.9	2946.8			3326.3									
					1886.7		2722.5		3003.8							
					1450.8											
2430.8	2657.9	3056.5	3107.4	3056.5												
						1746.5								2525.0		
1883.7	2422.2	2446.3	2490.2	2446.3												
1981.2	2197.6															
1702.3	1935.5															
					2667.9	2868.8										
2240.9					2417.1		2706.6		2993.7							
1516.4	1801.4															
1524.0	1761.1	1996.4	2057.4	1996.4			2316.5									
2792.0	3444.2	3486.9	3511.3	3486.9												
903.4	1159.8	1402.1	1595.6	1402.1			1708.4									
879.0	1118.6	1359.4	1527.0	1359.4			1657.5									
791.0	1054.6															
1460.0	1676.4	2015.3	2033.0	2015.3												

Appendix 4
Subsurface well section formation thicknesses (metres)

Short name	Unique well ID	Latitude	Longitude	KB elev (m)	KB elev (ft.)	Grid elev (m)	Grid elev (ft.)	Depth (m)	Canol Fm	Bluefish Mbr	Hume Fm	Ogilvie Fm	Dolomite Mbr	Mount Dewdney Fm	Michelle Fm
Alder C-33	300C336600136450	65.8671	136.9194	530	1739	523.6	1718	3714.0	106.0			855.0	413.9		
Arctic Red C-60	300C606650133450	66.8167	133.9219	92	302	86.9	285	2599.9	45.1		102.8				
Arctic Red R O-27	300O276650132450	66.7822	132.8266	136.6	448	131.7	432	2154.0	66.5		102.1				
Arctic Red West G-55	300G556650133000	66.7412	133.1662	44.5	146	39.3	129	3322.3	59.4		107.0				
Attoe Lake I-06	300I066730133150	67.4250	133.2528	86.3	283	83.2	273	2257.0	53.3		82.3				
Blackstone D-77	300D776550137000	65.7697	137.2486	645	2116	640.1	2100	4028.5	17.6			1078.1	426.7		152.4
Caribou N-25	300N256620134450	66.2461	134.8344	495.3	1625	487.7	1600	3600.3	211.8						
Clare F-79	300F796710133000	67.1389	133.2389	108.8	357	104.5	343	2525.6	84.8		96.0				
Cranswick A-22	300A226540131450	65.5169	131.8153	768.4	2521	762	2500	2869.1	85.4	12.2	142.3				
Cranswick A-42	300A426550133000	65.6868	133.1311	620	2034	613.3	2012	4267.2	57.3	7.9	168.3				
Eagle Plains N-49	300N496650138000	66.8150	138.1417	447.8	1469	441.1	1447	2922.7	15.5			714.2	109.7	180.1	
Martin House L-50	300L506650133150	66.8283	133.4008	88.1	289	83.8	275	2407.9	58.5	5.1	103.7				
McPherson B-25	300B256720135300	67.2336	135.5729	492.3	1615	484.6	1590	4136.1	18.3		108.2				
N Cathedral B-62	300B626620138300	66.1871	138.6981	540.1	1772	534.9	1755	2138.5	50.6			639.7	170.6		288.7
Nevejo M-05	300M056720134000	67.2494	134.0292	74.4	244	70.4	231	2378.7	33.2		89.9				
North Hope N-53	300N536640138150	66.5483	138.4250	350.5	1150	346.3	1136	4280.3	24.7			703.8	265.2	180.1	
North Parkin D-61	300D616630137000	66.3367	137.2169	489.2	1605	483.1	1585	3352.8	50.0			1074.1	319.4		
Ontaratue H-34	300H346630132000	66.3896	132.0976	141.7	465	137.2	450	4075.2	93.6	11.9	118.3				
Ontaratue I-38	300I386620131450	66.2944	131.8500	144.5	474	138.7	455	2287.5	95.1	6.7	114.9				
Peel F-37	300F376700134450	66.9406	134.8650	54.6	179	48.8	160	3368.0	28.9		104.9				
Peel H-71	300H716630134300	66.3411	134.7261	513	1683	506.3	1661	3392.1	79.2						
Peel River I-21	300I216620134150	66.1768	134.3142	381.3	1251	377.3	1238	2072.6	42.6						
Peel River M-69	300M696610133450	66.1489	133.9678	291.7	957	282.5	927	3272.6	28.9		131.1				
Porcupine G-31	300G316630140000	66.3394	140.1036	922	3025	917.4	3010	2657.9	272.8			441.9		56.4	
Sainville River D-08	300D086620133300	66.2853	133.5275	203	666	198.1	650	2651.8	64.3	4.5	148.5				
Satah River G-72	300G726700134000	66.8578	134.2325	89.6	294	86	282	2286.0	47.5	3.3	106.4				
Shaeffer Creek O-22	300O226650137150	66.6983	137.3278	352	1155	347.2	1139	3161.7	5.5			623.3	86.3		
South Peel D-64	300D646600132150	65.8844	132.4639	558.1	1831	553.2	1815	1985.5	66.5	6.1	141.7				
South Tuttle N-05	300N056630136450	66.4142	136.7730	504.7	1656	500.5	1642	3513.4	68.0			1166.4	432.8		61.9
Stony I-50	300I506730135150	67.4956	135.3794	321.9	1056	317.3	1041	3343.0	66.2		59.4				
Swan Lake K-28	300K286710133300	67.1283	133.5789	89.6	294	85	279	1838.2	63.7		92.7				
Taylor Lake K-15	300K156600133000	65.9108	133.0500	468.8	1538	464.8	1525	2378.7	47.0	3.7	167.0				
Trail River H-37	300H376640134450	66.6044	134.8497	393.2	1290	385.3	1264	3721.6	4.6		86.9				
Tree River East H-57	300H576710132150	67.1075	132.4112	108.2	355	103.3	339	1981.2	84.8	10.7	98.7				
Tree River F-57	300F576710132150	67.1076	132.4279	93	305	88.1	289	1979.7	79.5		95.7				
Tree River H-38	300H386720132150	67.2892	132.3500	79.6	261	75.3	247	1279.2	45.7		13.8				
Weldon Creek O-65	300O656610132150	66.0792	132.4503	222.8	731	218.8	718	2214.4	68.6	10.1	139.3				

Appendix 4 (cont'd)
Subsurface well section formation thicknesses (metres)

Landry Fm	Arnica Fm	Tatsieta Fm	Peel Fm	Delorme Gp (Fm)	Road River Gp (Fm)	Bouvette Fm	Mt Kindle Fm	Loucheux Fm	Franklin Mtn Fm	Slats Creek Fm	Saline River Fm	Mt Cap Fm	Mt Clark Fm	Proterozoic	Tsezotene Fm	Map Unit #1
224.0	299.6	31.4	269.4	300.8												
221.6	246.9	14.3	260.6	274.9			236.2									
240.5	241.7	37.5	274.6	312.1			442.9		778.7			15.0	21.6			
291.1	190.5	33.8	203.9	237.7			310.9									
					495.6	1201.2										
					1235.1			576.7	609.3	167.9						
230.7	320.6	33.6	242.3	275.9			363.6		41.5							
231.1	199.6	48.8	198.1	246.9			198.1		652.3					25.3		
641.6	76.2	79.2	224.1	303.3			337.7		579.7							
						933.6										
217.3	314.5	29.9	257.6	287.5			123.4									
	403.8	107.3	221.9	329.2			218.9		143.8							
					146.6	252.4										
288.1	228.6	44.2	31.7	75.9												
						1549.0										
230.1	259.1	51.8	193.5	245.3			303.3		743.7		39.6	94.5	92.7		874.1	90.9
241.1	231.7	57.9	178.0	235.9			309.7		169.1							
287.4	267.0	38.1	341.4	379.5			41.7									
					835.8		281.3		388.3							
					621.8											
227.1	398.6	50.9	165.2	216.1												
						778.5								132.9		
538.5	24.1	43.9	161.6	205.5												
216.4	88.4															
233.2	50.0															
					200.9	644.6										
176.2					289.5		287.1		349.3							
285.0	36.8															
237.1	235.3	61.0	259.1	320.1			62.2									
652.2	42.7	24.4	210.3	234.7												
256.4	242.3	193.5	112.8	306.3			272.8									
239.6	240.8	167.6	130.5	298.1			322.2									
263.6	224.6															
216.4	338.9	17.7	181.4	199.1												

Appendix 5
Measured sections

SECTION MTA-82-1 (8)

This section includes strata of the Bouvette Formation (ЄDb map unit) and the Road River Formation overlain by the Canol Formation. The section proceeds westward up a valley wall on the east side of Royal Mountain and down onto a ridge spur on the west side of the mountain. The base of the section is at 65°02'30"N latitude and 135°05'W longitude. The section is best seen on RCAF air photo A:12291-112 at Royal Mountain in the Wind River map area (106E).

Unit	Description	Unit thickness (m)	Cumulative thickness (m)
	Road River Formation		
11	**Limestone and shale:** Light and dark grey weathering and recessive unit; platy argillaceous lime mudstone with abundant tentaculites (or cricoconariids); some silicified laminae; perhaps slightly silty in some yellow weathering plates; rhythmically bedded; overlying unit at base of slope down to river level is rust and silver coloured silicified shale of the Canol Formation (Canol Formation, D.K. Norris, 1982c)	75.0	967.0
10	**Limestone:** Light and dark grey weathering and recessive unit; dark grey very thin and smooth bedded platy limestone with silicified dark grey laminae; some bed surfaces weather pale yellow; unit ends downslope in a 2 m thick interval of dark grey, medium bedded, sooty crinoidal wackestone	34.0	892.0
9	**Limestone:** Medium to dark grey weathering and recessive with a resistant upper cap; thin bedded platy and rhythmically bedded couplets of sooty lime mudstone separated by recessive shale seams grade abruptly upward to medium and thick bedded limestone containing silicified coral and crinoids at the top of the unit; some two-holed crinoids	45.0	858.0
8	**Limestone:** Dark and light grey weathering recessive saddle-forming unit; dark grey lime mudstone with pale yellowish-orange silty partings; very thin wavy bedding; some recognizable mass-flow deposits in individual crinoidal and brachiopodal wackestone	10.0	813.0
Total thickness of the Road River Formation is 164.0 m.			
	Bouvette Formation (ЄDb Map Unit)		
7	**Limestone:** A light grey weathering and very resistant unit that is the uppermost cliff-former on Royal Mountain; light grey weathering medium grey to tan, thick bedded to massive coralline wackestone, some favositid corals and brachiopods; some silicification of fauna, upper part on the west side of Royal Mountain is somewhat more recessive and thinner bedded	150.0	803.0
6	**Limestone:** A medium to dark grey weathering unit that is slightly recessive just below the summit cliff; thick bedded packages with wavy discontinuous partings; a dark grey pelletal? wackestone	90.0	653.0
5	**Limestone:** Light grey weathering and moderately resistant unit; entire unit is formed of ragged cliffs of medium to thick bedded, medium brownish-grey pelletal wackestone with a few corals	273.0	563.0
4	**Limestone:** Light grey weathering and resistant unit; prominent ragged light grey cliffs of very thick but poorly bedded fossiliferous coralline tan wackestone; scattered favositid and cup corals	108.0	290.0
3	**Limestone:** A prominent, light grey, resistant cliff-forming unit; thick planar beds of tan, unfossiliferous pelletal wackestone	61.5	182.0
2	**Limestone:** Medium to dark brownish grey weathering and recessive unit; 30% exposed on a vegetated slope; dark brown pelletal lime wackestone, thin- to medium-planar to slightly wavy bedding; rather lumpy bed surfaces (bioturbated); sharp contact with underlying unit	73.0	120.5
1	**Limestone:** Brownish grey weathering and resistant unit; prominent bench former of light brownish grey, pelletal packstone cemented by calcite; medium to thick, very smooth planar bedding; thinner wavy beds of darker brownish grey pelletal wackestone; four distinct zones of thicker beds with a cliff at the top of the unit; this lithology is representative of underlying units	47.5	47.5
Incomplete thickness of the Bouvette Formation is 803.0 m.			
Total thickness of Section MTA-82-1 is 967.0 m.			

SECTION MTA-82-2 (13)

This section includes strata of the Bouvette Formation (ЄDb map unit) and of the Road River Formation. It extends northeast along Prongs Creek at the mountain front in the west-central part of the Wind River map area (106E). The base of the section is at 65°07'20"N latitude and 135°40'W longitude. The section may be observed on RCAF air photo A:12229-257.

Unit	Description	Unit thickness (m)	Cumulative thickness (m)
	Road River Formation		
8	**Shale and limestone:** Brown to black weathering and moderately recessive unit; medium solitary beds of dark grey, slightly crinoidal and intraclastic lime mudstone are rhythmically interbedded with black shale in intervals several metres thick; these intervals are separated by thicker intervals of platy, calcareous shale; a few thick beds that may be mass-flow deposits	70.0	442.5
Incomplete thickness of the Road River Formation is 70.0 m.			
	Bouvette Formation (ЄDb map unit)		
7	**Limestone and dolostone:** Bluish grey weathering, resistant unit that forms a canyon in Prongs Creek; lime wackestone or mudstone with medium to thick planar bedding; topmost beds partly dolomitized to sucrosic light brown dolostone with silicified, large orthoconic cephalopods and corals including cateniporids and *Bighornia*	150.0	372.5
6	**Limestone:** Bluish grey weathering and resistant unit; medium to thick, uniform planar bedded lime wackestone or mudstone; some dolomitized to sucrosic light brown dolomite; lower part of unit is a silicified boxwork	372.5	222.5
5	**Limestone:** Medium bluish grey and resistant unit; lime wackestone that appears to be medium to thick bedded but is highly sheared with veinlets of white calcite	45.5	155.0
4	**Calcareous dolostone:** Light to medium grey weathering, same as underlying unit but more calcareous; some crinoids (and amphiporids?)	30.0	109.5
3	**Dolostone:** Light to medium grey weathering and resistant; a basal thin planar bedded interval a few metres thick passes abruptly upward to thick bedded, slightly crinoidal dolostone; a few other thinner bedded intervals occur thoughout; the thin bedded intervals have sharp basal contacts with the underlying thicker beds	49.5	79.5
2	**Dolostone:** Light to medium grey weathering and resistant unit; a single thin to medium planar bedded bedding cycle of finely crystalline dolostone; top bed forms a northwest-trending reach of the creek	12.0	30.0
1	**Dolostone:** Light to medium grey weathering and resistant unit; medium beds grade upward to thicker beds in two bedding cycles; finely crystalline light grey dolostone	18.0	18.0
Incomplete thickness of the Bouvette Formation is 372.5 m.			
Total thickness of Section MTA-82-2 is 442.5 m.			

SECTION MTA-82-3 (41)

This section begins in the upper part of the Delorme Group and includes the Arnica, Landry and part of the Mount Baird formations. It extends northward down the nose of the ridge at the front of the Mackenzie Mountains in the central part of the Snake River map area (106F). The Arnica Formation of this section has been mapped previously by Douglas (1982) as Arnica Formation. These strata also have been previously assigned to the Cranswick Formation (Norris, A.W, 1968a, 1985). The base of the section is at 65°30'30"N latitude and 133°03'W longitude. The section may be seen on RCAF air photo A:20673-84.

	Mount Baird Formation		
9	**Limestone:** Brownish to bluish grey weathering resistant and cliff-forming unit; dark grey, thick bedded crinoidal wackestone with some two-holed crinoids; this unit might be equivalent to the the Hume Formation	7.5	469.0
8	**Shale:** Rusty brown weathering and recessive bench-forming unit; brown, sooty and calcareous shale; unfossiliferous	50.5	461.5
Incomplete thickness of the Mount Baird Formation is 58.0 m.			
	Arnica Formation (Cranswick Formation of A.W. Norris, 1985)		
7	**Limestone:** dark grey weathering and moderately resistant unit that forms a flatiron on the ridge slope; thin to medium bedded flaggy beds with thin platy partings; a slightly argillaceous crinoidal lime mudstone with some two-holed crinoids	93.0	411.0
6	**Limestone:** Dark grey weathering and recessive unit; shaly lime mudstone that has laminated bedding and is very platy; some yellow argillaceous partings; many bed surfaces are crowded with cricoconarids?	40.5	318.0
5	**Limestone:** Dark grey weathering and slightly resistant unit that continues downslope; medium to thick, very smooth, continuous planar but wavy bedded lime mudstone and skeletal wackestone; groups of medium beds are separated by thinner more recessive platy intervals; some crinoids, ostracodes, brachiopods and a few lithostrotion-like and favositid corals; one bed of small, coiled cephalopods 20.0 m above base of unit	93.0	277.5
5	**Limestone:** Medium grey weathering and slightly recessive unit; medium to light grey, thin to medium bedded platy lime mudstone	90.0	184.5
3	**Limestone:** Colour banded light and dark grey weathering and moderately resistant unit that leads down to bench; thick dark grey stromatoporoidal and coralline beds alternate with medium grey, thin to medium bedded lime mudstone	7.5	94.5

Unit	Description	Unit thickness (m)	Cumulative thickness (m)
2	**Dolostone:** Colour banded light grey and dark brownish-grey weathering and moderately resistant bench forming unit; medium to thick bedded intervals of dark brownish grey dolostone grade upward to light and dark grey dololaminite in many rhythmic intervals several metres thick; many dark intervals have erosional basal contacts with the underlying lighter grey dolostones, chips of light grey dolostone are commonly incorporated in the dark dolostone beds near these contacts; much of this unit is, however, simply interlaminated light and dark grey dolostone in medium beds; a few beds with abundant amphiporids; unit ends in a prolifically fossiliferous biostromal bed containing abundant hemispheroidal stromatoporoid corals (*alveolites*? and *coenites*)	52.0	87.0
Total thickness of the Arnica Formation is 376.0 m.			
	Delorme Group		
1	**Argillaceous dolostone:** Bright orange weathering and slightly resistant in lower part of unit grading upward to more recessive, yellow weathering beds; lower part is medium to thick, planar but irregularly bedded, featureless, yellow, argillaceous dolostone with limonite common along bedding planes; a few greenish-grey beds of lime mudstone containing waxy green shale concentrated in mottled patches along bedding planes; a little pyrite; limestones have gradational contacts with dolostone beds and tend to be interlaminated near contacts; upper part of unit is recessive, platy, yellow dolostone; this unit may correlate with the Tatsieta Formation of the subsurface	35.0	35.0
Incomplete thickness of the Delorme Group is 35.0 m.			
Total thickness of Section MTA-82-3 is 469.0 m.			

SECTION MTA-82-4 (30)

This section includes strata of the Mount Kindle Formation and Delorme Group. The Delorme Group was mapped here as the SDd map unit (Norris, 1975) and is subdivided here into the Tatsieta and Peel formations of Pugh (1983) although these subdivisions of the Delorme Group are poorly defined at this location. The lower part of the Mount Kindle Formation is similar to the Whittaker Formation of the southern Mackenzie Mountains (Ludvigson, 1985). The section extends southwestward up the nose of a ridge in the west-central part of the Snake River map area (106F) and the base of the section is at 65°27'N latitude and 133°35'W longitude. It is best seen on RCAF air photo A:20673-114.

	Delorme Group		
	Tatsieta Formation?		
11	**Dolostone:** Dull yellowish grey weathering and slightly resistant unit; in rhythmic cycles of brownish-grey and grey dolostone grading up to yellow, argillaceous dolostone; medium planar bedding; at 105.0 m above base of unit, several intervals a few metres thick of thin to medium bedded, medium grey lime mudstone beds; some mudcracked beds; partly dolomitized with thin, anastomosing laminae; conformably overlain by the Arnica Formation	165.0	748.5
Total measured thickness of the Tatsieta Formation is 165.0 m.			
	Peel Formation?		
10	**Dolostone:** Yellow weathering and recessive unit; medium to thick bedded, silty, yellow dolostone, at 22.5 m above the base of the unit is a thick lime mudstone bed with irregular partings; laminae display prism type shrinkage cracks	45.0	583.5
9	**Dolostone and limestone:** A yellowish grey weathering and resistant step in the ridge line; seven or eight rhythmically bedded cycles of medium bedded, grey lime mudstone grading up to interlaminated lime mudstone and yellow dolostone (platy lime mudstone clasts in a dolomicrite matrix) overlain by thick beds of yellow argillaceous dolostone; the base of the dolostone is erosional in many cycles	25.5	538.5
8	**Dolostone:** Yellow weathering and recessive unit; thin to thick bedded, argillaceous yellow dolostone; peculiar oxidation patterns in some beds (around roots? and on hard grounds); at 27.0 m above base of unit a 2.0 m thick cliff of platy lime mudstone; much dololaminite with silt outlining laminae, beds display conchoidal fracture surfaces	57.0	513.0
7	**Dolostone and limestone:** Yellow weathering and recessive unit with a very recessive lower part; mainly thin bedded silty dolostone and dololaminite with subsidiary beds of dolomitic lime mudstone (interlaminated lime mudclasts in yellow dolostone); large mudcracks common with yellow dolomicrite infill; upper part more resistant, flaggy beds of grey lime mudstone with green argillaceous material	78.0	456.0
Total measured thickness of the Peel Formation is 205.5 m.			
Total thickness of the Delorme Group is 370.5 m.			

Unit	Description	Unit thickness (m)	Cumulative thickness (m)
	Mount Kindle Formation		
6	**Dolostone:** Brownish grey weathering and resistant unit; lower part of unit dark brownish grey, thick beds of stromatactis alternate with darker beds; abundant solution collapse breccia with clasts cemented by white dolomite; upper part more recessive and is colour banded light and dark grey; dark, thick beds contain abundant silicified stromatoporoids and corals; upper contact with Delorme beds is very irregular and contains ferroan dolomite cement	40.5	378.0
5	**Dolostone:** Colour banded light and dark grey and slightly resistant; upper part is thin to medium white, unfossiliferous beds alternating with dark beds containing silicified colonial rugose corals; lower 22.5 m is uniformly yellowish grey with some distinct argillaceous or silty seams	63.0	337.5
4	**Dolostone:** Light grey weathering and very resistant cliff former with thick cliffs; largely recrystallized to white and grey, coarsely crystalline dolomite (like Presqu'ile dolomite); darker and thinner bedded in lower 20.0 m; some crinoids	46.5	274.5
3	**Dolostone:** Light grey weathering, cliff forming and very resistant unit; Presqu'ile-like white dolomite in finely brecciated dolostone; somewhat vuggy between clasts; may have had some primary pores as many vugs are strung out parallel to bedding	49.5	228.0
2	**Dolostone:** Dark brownish grey weathering and moderately resistant unit; medium planar beds with irregular partings; abundant silicified corals including syringoporids, halysitids and others; scattered small chert nodules; this unit is dark on air photos	28.5	178.5
1	**Silicified dolostone:** Dark brownish grey weathering and slightly resistant unit that forms a vegetated bench; incomplete exposure; thin-, to medium-wavy, continuous bedding becomes thicker higher in unit and the thin chert bands break up into irregular nodules toward the top of the unit; platy limestones of the transitional facies of the Franklin Mountain Formation underlie this unit	150.0	150.0

Total thickness of the Mount Kindle Formation is 378.0 m.

Total thickness of Section MTA-82-4 is 748.5 m.

SECTION MTA-82-5 (22)

This section includes strata of the Road River and Ogilvie formations. It extends northward along a series of ridges and across a valley in the east-central part of the Wind River map area (106E). The base of the section is at 65°22'30"N latitude and 134°10'W longitude, and is at a thrust fault. The section is best seen on RCAF air photo A:12247-89.

	Ogilvie Formation		
9	**Limestone:** Medium grey weathering and slightly recessive unit; very thin and smooth bedded, platy lime mudstone with planar to slightly wavy bedding; faintly laminated, slightly argillaceous partings; probably transitional to Road River; unit forms rounded top of hill and vegetated dip slope	100.0	650.5
8	**Limestone:** Light to medium grey weathering and resistant unit; a very prominent cliff former; slightly crinoidal lime mudstone; thin to thick, irregular to smooth bedding; thicker beds more irregular; some parts of this cliff are finely brecciated and cemented by white calcite	24.0	550.5

Total thickness of the Ogilvie Formation is 124.0 m.

	Road River Group		
7	**Shale and limestone:** Dark grey to brown weathering and recessive unit; dark grey calcareous shale with more resistant, fine grained carbonate debris flows every two to three metres; flows are 0.5 m thick with sand to granule-sized fragments; some of these flows are grainstones and may have been grainflow deposits, some with erosional bases; one prominent rib of a dense array of flows at 150.0 m overlain by recessive shales	177.0	526.5
6	**Calcareous shale:** Dark grey and recessive unit almost completely covered in valley floor, but scattered, broken outcrop is the same as the shales of the overlying unit	105.0	349.5
5	**Limestone and shale:** Dark grey weathering and somewhat recessive unit; argillaceous platy lime mudstone with some intervals of calcareous shales; some grey skeletal wackestone interbeds containing crinoids and brachiopods, pastel pink and yellow weathering silty lime mudstone beds interbedded with thin to medium bedded finely particulate mass-flow deposits dominate the upper 20 m; this unit extends down to the valley floor	81.0	244.5
4	**Limestone:** Bluish grey weathering and very resistant cliff forming unit composed of multiple mass-flow deposits of particulate rubble floatbreccia and packbreccia; a few shale intervals in lower part; massive cliff up to 30 m with irregular thick beds containing large, angular to subrounded clasts up to 0.3 m across; crinoids and coenitid corals abundant; the main cliff is overlain by thin- to medium-planar beds of finely particulate fragments (mud lumps?); some silicified favosited corals	42.0	163.5

Unit	Description	Unit thickness (m)	Cumulative thickness (m)
3	3 **Shale:** Orange to pale yellow weathering and recessive unit; black, calcareous, sooty shale particularly near base of unit; a few lenticular crinoidal debris flows near base several metres broad; upper part of unit more of a platy argillaceous lime mudstone	45.0	121.5
2	2 **Dolostone breccia:** Yellow weathering and resistant unit; brown, dolomite-cemented, regolithic breccia of dololaminite and tabular chert fragments; a disoriented polymictic particulate rubble floatbreccia; abundant silicified corals (coenitids and other colonial rugose corals); poorly developed, irregular, discontinuous bedding; this thin unit appears to rest unconformably upon the underlying unit and may represent a thin sliver of strata equivalent to the Delorme Group that unconformably overlies Road River Group strata similar to Ordovician and Silurian strata of the Whittaker Formation in the Mackenzie Mountains	21.0	76.5
1	1 **Dolostone:** Dark brownish grey weathering and resistant unit; thin to medium bedded dolostone; faintly laminated with elongate, dark grey, potato-shaped chert nodules and partly silicified beds; rusty wavy bed parting; some small-scale scour-fillings; chert broken by compaction in places; slightly crinoidal; lower 10 m platy and cherty lime mudstone rather than dolostone; as discussed above, this unit resembles the Whittaker Formation; base of unit is at a slight bedding-plane-parallel fault; this unit overlies Precambrian interbedded orange dolostones and quartzarenites of the “Knorr Range Succession” (D.K. Norris, 1982c)	55.5	55.5

Incomplete thickness of the Road River Group is 526.5 m.

Total thickness of Section MTA-82-5 is 650.5 m.

SECTION MTA-82-6 (19)

This section includes strata of the Mount Kindle, Arnica, Landry and Hume formations and of the Delorme Group, including probable equivalents of the Peel and Tatsieta formations. The section begins at a thrust fault and it extends southward along a mountain ridge down to a creek near the headwaters of Cranswick River in the southeast part of the Snake River map area (106F). The base of the section is at 65°13'N latitude and 132°16'W longitude.

Hume Formation

15	**Argillaceous limestone:** Yellowish brown weathering and very recessive; thin bedded to laminated platy greenish-grey lime mudstone and lumpy, thin bedded, orange and greenish-yellow mottled skeletal wackestones and packstones that are abundantly fossiliferous (brachiopods, crinoids, thamnoporid-like corals, and trilobites); very abrupt contact with the underlying unit	20.0	1061.5

Incomplete thickness of the Hume Formation is 20.0 m.

Landry Formation

14	**Limestone:** Light grey weathering and very resistant, prominent, ribbed cliff-forming unit; very thick beds of tan pelletal wackestones and packstone are separated by 0.2 to 0.5 m thick, recessive, dark grey intervals of dark grey, thinly and indistinctly bedded lime mudstone, some spar-filled fenestral fabric in thicker beds; virtually no fauna apart from one colonial coral	230.0	1041.5

Total measured thickness of the Landry Formation is 230.0 m.

Arnica Formation

13	**Limestone and dolostone:** A dark brownish grey weathering and resistant ragged cliff former that extends across the highest part of the mountain; an overall ribbed appearance due to poorly developed cycles of thin and smooth bedded, dark brownish grey, fetid lime mudstone alternating with thick and very thick beds of brownish grey crinoidal wackestone; some thick beds contain abundant amphiporids; thicker beds are partly dolomitized imparting a mottled appearance to the rock; large, lighter grey crinoidal patch mounds are scattered throughout, particularly in the upper part of the unit; these stratigraphic mounds are approximately 20 to 50 m across and 5 to 20 m thick with flat bases and convex-upward upper surfaces; three or four of these were observed along this line of section	120.0	811.5
12	12 **Dolostone:** Medium greyish brown to brown weathering and resistant, lower, brown cliff-forming unit of the Arnica Formation that appears to be a patch mound; crinoidal, dark brown wackestone with some two-holed crinoids; thick planar bedding	15.0	691.5
11	11 **Dolostone:** Dark brown and light grey, colour-banded weathering and slightly recessive unit that forms a bench along ridge line; brown medium-planar bedded amphiporid- and crinoid-bearing, finely crystalline dolostone intervals alternate with light grey dololaminite; one 1.5 m thick, smooth planar bed of dark grey to brownish grey lime mudstone with thin, discontinuous partings in the centre of the unit	36.0	676.5

Total measured thickness of the Arnica Formation is 171.0 m.

Unit	Description	Unit thickness (m)	Cumulative thickness (m)
	Delorme Group		
	Tatsieta Formation		
10	**Dolostone and limestone:** bright orange and yellowish orange weathering and fairly resistant unit that extends across a steep upward pitch; bluish grey, medium bedded, intraclastic lime mudstone intervals about 1.5 m thick grade upward to orange, argillaceous dololaminite through a gradational zone of flaser-like bedding of laminar lime mudclasts in a yellowish orange detrital dolomite matrix; most of unit is yellowish orange, thin to medium bedded dololaminite; limestone beds are commonly mottled with yellowish green argillaceous material and have planar but lumpy bed surfaces; also there are two, thick solitary beds of impure quartzarenite fine sandstone with a 1.0 m thick bed at 10.0 m above the base of the unit; some burrows in sandstones; this unit is the upper, yellow part of the Delorme Group	72.0	640.5
	Total measured thickness of the Tatsieta Formation is 72.0 m.		
	Peel Formation		
9	**Dolostone:** Light grey weathering and very resistant, massive cliff forming unit; the lower 90.0 m forms a continuous cliff but the upper 60.0 m is less resistant, medium- to thick-planar bedded dololaminite with fenestral fabric and stromatolitic laminae; upper, less resistant part is white weathering, predominantly thin bedded with some solitary beds of amphiporid `spaghetti stone' and detrital carbonate beach zone mud chip deposits of sand and granule size; this unit is the middle grey part of the Delorme Group	150.0	568.5
8	**Dolostone:** Light grey weathering and moderately resistant; thin- to medium-planar smooth bedding; featureless to laminated; at 33 to 39 m above the base of the unit is a white weathering, more recessive interval; this unit and the underlying units of the Delorme Group form a distinct, lower yellow band within this formation	75.0	418.5
7	**Dolostone:** Light yellow to greenish yellow weathering and slightly resistant unit that forms a steeper pitch along the ridge line; yellow, medium to thick, smooth and planar bedded dololaminite with abundant, thin, silt stringers and shrinkage cracks	27.0	343.5
6	**Dolostone:** Light to medium grey weathering and slightly resistant unit that forms a ragged cliff; medium to thick, smooth, planar bedded aphanocrystalline dolostone with lenticular, rusty red weathering pods of darker dolomite; in the lower part of the unit, these pods are several metres across and 0.5 m thick	45.0	316.5
5	**Dolostone:** Bright yellow weathering and slightly recessive unit with a basal, orange weathering band; a thin to medium, smooth and planar bedded faintly laminated dololaminite; basal orange band is blocky (i.e., thick bedded) silty featureless dolostone	36.0	271.5
4	**Silty dolostone and dolomitic silty shale:** Dark greyish brown weathering and very recessive unit; laminated and thinly laminated, finely platy silty dolostone and dolomitic shale; a significant darker (deeper water?) deposit than the overlying Delorme units	3.5	235.5
	Total measured thickness of the Peel Formation is 336.5 m.		
	Total measured thickness of the Delorme Group is 408.5 m.		
	Mount Kindle Formation		
3	**Dolostone:** Light grey weathering and moderately resistant; thin to thick, fairly smooth planar bedded, light grey, faintly laminated, finely crystalline dolostone; an irregular, poorly exposed upper contact but some of the yellowish orange stain of overlying Delorme strata has penetrated downward into the Mount Kindle	49.0	232.0
2	**Dolostone:** medium to light grey weathering and moderately resistant unit that forms a steep pitch along the section ridge line; medium to thick planar bedding with slightly irregular bed partings; crinoidal, faintly mottled, finely crystalline grey dolostone; thick, lighter grey beds have been recrystallized to coarsely crystalline white and grey dolostone; unit capped by a prominent, 3.0 m thick cliff containing five or six, 0.2 m thick bands of reworked silicified corals, such as *halysites* and favositid-like corals; this unit is slightly darker than the overlying unit	165.0	183.0
1	**Dolostone:** dark brownish grey weathering and resistant unit that forms a vegetated bench; thin to medium planar to irregularly bedded cherty dolostone with prominent partings; faintly laminated with one coralline band at 4.0 m containing favositids and syringoporids; abundant elongate to potato-shaped dark grey to black chert nodules; this unit is typical of the Whittaker Formation; probably 40 more metres of the lithology of this unit exposed down to creek level	18.0	18.0
	Incomplete thickness of the Mount Kindle Formation is 232.0 m.		
	Total thickness of Section MTA-82-6 is 1061.5 m.		

Unit	Description	Unit thickness (m)	Cumulative thickness (m)
	SECTION MTA-82-7 (1)		
	This section includes strata of the Precambrian Sheepbed Formation, and Paleozoic strata of the Franklin Mountain, Mount Kindle and Road River formations. The section extends northward across a west-trending mountain ridge on the north side of the Bonnet Plume River in the central part of the Nadaleen River map area (106C). The base of the section is at 64°25'47"N latitude and 132°50'53"W longitude.		
	Road River Formation		
8	**Shaly dolostone and limestone:** Dark brownish grey weathering and recessive to somewhat resistant unit that is largely vegetated; unit extends across a hill and has a light grey capping limestone; dark brownish grey, thin to laminated, platy and cherty dolostone with abundant black chert forms most of the unit; medium brownish grey slightly rusty bed partings; above 270.0 m a series of large, limestone debris-flow deposits of coarse particulate rubble floatbreccia and particulate granule packbreccias interbedded in a spectacular series of breccias; this unit is abruptly overlain by the silver-grey siliceous shales of the Canol Formation	352.5	1586.0
7	**Dolostone:** A dark grey, recessive unit that leads down to the valley floor; some cherty, brown dololaminite interbedded with crinoidal mass flow breccia deposits as in unit 8; some coarsely costate brachiopods	90.0	1233.5
	Total measured thickness of the Road River Formation is 442.5 m.		
	Mount Kindle Formation?		
6	**Dolostone:** Light grey weathering and very resistant unit that forms the summit cliffs; thick, but rather indistinctly bedded with scattered silicified crinoids	120.0	1143.5
	Total measured thickness of the Mount Kindle Formation is 120.0 m.		
	Franklin Mountain Formation		
5	**Siliceous dolostone:** Light to medium grey weathering and very resistant unit; siliceous dolostone with irregular grey chert masses (20% of rock volume) in very thick beds, almost 50% laminar grey chert in upper part; chert laminae have flat bases and irregular tops (may be replacement of stromatolites) in medium to thick planar beds	321.0	1023.5
4	**Dolostone:** Pale yellowish grey weathering and recessive unit; thin- to medium-planar and smooth bedded, slightly argillaceous dololaminite with some fenestral fabric, unit extends along ridge-line to foot of cliff	90.0	702.5
3	**Dolostone:** Light grey, nearly white weathering and very resistant unit that forms a discontinuous cliff; basal 30.0 m is thick bedded white dolostone with abundant small vugs (swiss cheese); middle is very thick bedded with vague, stromatolitic patterns, and upper part contains some medium grey, medium beds of dololaminite with laminoid and irregular fenestral fabric	225.0	612.5
	Total measured thickness of the Franklin Mountain Formation is 636.0 m.		
	Sheepbed Formation		
2	**Shale and siltstone:** Medium brown weathering and recessive unit; silty, fissile, siliceous shale; a few intervals of thin, irregularly bedded litharenite? siltstone; green shale common	337.5	387.5
1	**Dolostone:** Pale greyish yellow weathering and resistant unit that forms a knob-like cliff; medium crystalline featureless dolostone; medium to thick, poorly developed bedding; some orange silty dololaminite and mud chip breccias; some irregular silicified burrows (1.0 cm across)	50.0	50.0
	Incomplete thickness of the Sheepbed Formation is 387.5 m.		
	Total thickness of Section MTA-82-7 is 1586.0 m.		
	SECTION MTA-82-8 (32)		
	This section includes strata of the Mount Baird and Road River formations and parts of the Arnica and Hume formations. This section includes the type section of the Mount Baird Formation (Norris, A.W., 1985) and part of the type section of the Cranswick Formation of Norris, A.W. (1968a, 1985). Norris, D.K. (1982d) included Cranswick strata within the Arnica Formation as a map unit. The section proceeds northwestward up a small creek tributary of Snake River in the west-central part of the Snake River map area (106F). The base of the section is at 65°27'10"N latitude and 133°35'W longitude. It is best seen on RCAF air photo A:20673-115.		
	Hume Formation		
9	**Limestone:** Bluish grey weathering and resistant cliff-forming unit; thin- to medium-planar but irregular bedding with yellow, argillaceous partings; a skeletal lime wackestone containing abundant brachiopods (atrypids?), corals, crinoids and some cephalopods, This unit was formerly included within the Mount Baird Formation, but, in accordance with Norris, D.K. (1982d), strata of unit 9 are assigned here to the Hume Formation	30.0	448.0
	Incomplete thickness of the Hume Formation is 30.0 m.		

Unit	Description	Unit thickness (m)	Cumulative thickness (m)
	Mount Baird Formation		
8	**Calcareous siltstone:** Light yellowish orange weathering and recessive slope-forming unit; very thin to laminated platy bedding with a few thicker thin beds	144.0	418.0
7	**Argillaceous limestone and shale:** Light to medium yellowish grey weathering and slightly resistant, particularly in its upper part; laminated to very thin bedded, platy, argillaceous dolomitic lime mudstone; unit capped by thin bedded, more resistant cliff former; a few orthoconic cephalopods on bed surfaces; lower part is more fissile and shaly and soft weathering	51.0	274.0
6	**Argillaceous limestone:** Light greenish and orangish yellow weathering and moderately resistant, ragged, cliff-forming unit; an argillaceous, faintly laminated, platy, dolomitic lime mudstone with some low-angle crossbeds and soft-sediment deformation structures in laminated to very thin beds	50.0	223.0
5	**Shale:** Greyish yellow weathering and recessive unit; a laminated light grey dolomitic and calcareous shale; laminated with a thin, platy parting	51.0	173.0
4	**Argillaceous limestone and shale:** Medium yellowish brown weathering and somewhat resistant unit that forms a ragged cliff; a lower more resistant band 100 m thick is composed mainly of argillaceous, medium brownish grey crinoidal wackestones with thin to medium planar to irregular bedding; crude normal grading of skeletal fragments in some beds; the overlying 20.0 m is a more recessive platy argillaceous lime mudstone with argillaceous partings; tentaculitids and brachiopods on bed surfaces	30.0	122.0
Total thickness of the Mount Baird Formation is 326.0 m.			
	Road River Formation (formerly Prongs Creek Formation of Norris, A.W., 1968b)		
3	**Shale and limestone:** Black weathering and very recessive unit; calcareous soft black shale and platy dark grey lime mudstone; a few solitary medium beds of lime mudstone, tentaculites on bed surfaces	69.0	92.0
2	**Limestone and shale:** Black weathering and slightly resistant cliff and bench forming unit at river level; groups of medium, smooth beds of lime mudstone alternate with fissile, soft, laminated and platy shale and argillaceous platy lime mudstone; conularids? and tentaculitids? on bed partings; one 1.5 m thick bed of brecciated lime mudstone caps unit; breccia cemented by white calcite	21.0	23.0
Total thickness of the Road River Formation is 90.0 m.			
	Arnica Formation (Cranswick Formation of Norris, A.W., 1985)		
1	**Silicified limestone:** Dark grey weathering and very resistant unit that forms the river bed and a dip slope on the south side of the river; a thin to medium, smooth bedded, dark grey lime mudstone sequence that is strongly silicified and brecciated; stratiform breccia bodies of cemented mosaic and rubble packbreccias occur along groups of beds; white quartz cements clasts and white calcite infills the centres of vugs; conularids abundant on bed surfaces	2.0	2.0
Incomplete thickness of the Arnica Formation is 20.0 m.			
Total thickness of Section MTA-82-8 is 448.0 m.			

SECTION MTA-82-9 (44)

This section includes strata of the Franklin Mountain and Mount Kindle formations. It extends northward along a north-trending ridge line between Snake River and Cranswick River in the central part of the Snake River map area (106F). The base of the section is at 65°34'28"N latitude and 132°46'34"W longitude. The section may be seen on RCAF air photo A:20673-82.

Unit	Description	Unit thickness (m)	Cumulative thickness (m)
	Mount Kindle Formation		
7	**Dolostone:** Yellowish grey weathering and slightly recessive unit along ridge line; medium bedded, faintly laminated dolostone with a noticable amount of yellowish argillaceous material; otherwise similar to underlying unit; contact with overlying yellow dolostones of the Delorme Group is marked by a solitary thick bed containing abundant silicified hemispheroidal stromatoporoids	120.0	687.5
6	**Dolostone:** A banded light and dark grey weathering and resistant unit that extends along a ridge across a small summit peak; a medium planar bedded, faintly colour laminated, medium to dark grey dolostone with solitary thick beds containing a few silicified corals; medium to thick bedded, brownish-grey mottled beds near top of unit	114.0	567.5
5	**Dolostone:** Grey to dark brownish grey weathering and resistant, slope-forming unit that extends up to the summit of the ridge line; light grey, medium planar bedded at base grading upward to brown, very thick bedded, rough weathering, fetid dolostone; abundant silicified corals and crinoids 15.0 m above the base of the unit (*Palaeophyllum*, *Bighornia*, *Favostina* and others)	78.0	453.0
Total measured thickness of the Mount Kindle Formation is 312.0 m.			

Unit	Description	Unit thickness (m)	Cumulative thickness (m)
	Franklin Mountain Formation		
4	**Limestone:** Medium light grey weathering and slightly resistant unit along ridge line; thin bedded skeletal and intraclast? wackestone or lime mudstone with yellow argillaceous partings; the basal 2.0 m is white weathering, thick bedded dolostone	33.0	375.5
3	**Limestone:** Light grey weathering and resistant, bluff-forming unit that extends up slope to ridge line; intervals of thin platy to flaggy beds of skeletal lime wackestones, packstone and mudstone with irregular, yellow, argillaceous partings alternate with solitary, medium beds of lime mudstone; fauna include gastropods (*Ophileta*), trilobites, small brachiopods, and crinoids	200.0	342.5
2	**Limestone:** Medium grey weathering and recessive unit that forms a vegetated saddle along the ridge line; medium grey, thin bedded and platy lime mudstone; some smooth bedded and unfossiliferous; some with fragments of skeletal material along irregular bedding planes separated by yellow, argillaceous seams	52.5	142.5
1	**Dolostone:** Light grey weathering and resistant unit that forms a knob along the ridge line; light to medium grey, medium to thick bedded dololaminite with many pisolitic and oncolitic bands scattered throughout; oncolite bands tend to be silicified; this unit unconformably overlies the Precambrian Katherine Formation	90.0	90.0

Total measured thickness of the Franklin Mountain Formation is 375.5 m.

Total measured thickness of Section MTA-82-9 is 687.5 m.

SECTION MTA-82-10 (45)

This section is an extremely homogeneous sequence of limestones within the Bouvette Formation (ЄDb map unit) which is probably of Silurian to Devonian age. It is in the west-central part of the Wind River map area (106E) about 20 km north of Royal Mountain. The base of the section is at 65°14'36"N latitude and 135°11'15"W longitude. The section is well shown on RCAF air photo A:12225-242.

	Bouvette Formation (ЄDb map unit)		
4	**Limestone:** A bluish grey weathering and somewhat recessive unit that extends down a dip slope with poor exposure; very thin bedded platy lime mudstone intervals alternate with medium smooth beds of lime mudstone; a few, yellow, smooth bedded dolomitic intervals	262.0	838.0
3	**Limestone:** Light grey weathering and very resistant massive cliff-forming unit; very thick beds of tan pelletal wackestone; the uppermost 20.0 m is more recessive and thinner bedded	105.0	576.0
2	**Limestone:** Bluish grey weathering and resistant cliff-forming unit; brown pelletal lime wackestone and packstone, solitary thick beds or groups of two or three thick beds are separated by thin intervals of thin to very thin, smooth, wavy bedded, dark brownish-grey lime mudstone; most cycles capped by yellow dolomicrite and contain good laminoid fenestral fabric; some thin bedded intervals are pink	234.0	471.0
1	**Limestone:** Bluish grey weathering and moderately resistant unit that extends up a vegetated slope with about 50 percent outcrop; thin bedded intervals with smooth bed partings alternate with medium and thick bedded intervals of tan pelletal wackestone; some poorly preserved but definite favositid corals in thicker beds	237.0	237.0

Incomplete thickness of the Bouvette Formation is 838.0 m.

Total thickness of Section MTA-82-10 is 838.0 m.

SECTION MTA-82-11 (27)

This section includes the entire lower Paleozoic Platform carbonate sequence above the unconformity beneath the Franklin Mountain Formation and above the underlying Precambrian sequence. The Franklin Mountain, Mount Kindle, Arnica and part of the Landry formations and part of the Delorme Group, including equivalents of the Tatsieta and Peel formations, comprise this section on the western edge of Upper Ramparts River map area (106G). The base of the section is at 65°24'44'N latitude and 131°49'04"W longitude. The section extends northward along a ridge line.

	Landry Formation		
15	**Limestone:** Bluish grey weathering and resistant unit that extends down to the toe of the ridge nose; thin, smooth bedded intervals of dark brownish grey lime mudstone alternate with medium, smooth-bedded intervals of tan pelletal wackestone; a few light brown dolomitic beds	70.0	1415.0

Incomplete thickness of the Landry Formation is 70.0 m.

	Arnica Formation		
14	**Dolostone and limestone:** Colour banded grey and dark greyish brown weathering and slightly recessive unit; basal 20.0 m of unit is an interval of grey, medium lime mudstone beds that are mottled brown by partial dolomitization; thick, dark brown dolostone beds grade upward to thin, platy, light to medium brownish grey and grey dololaminite to form typical colour bands of the Arnica Formation; clasts of light grey dololaminite along the bases of some dark beds where they overlie light grey laminites	84.0	1345.0

Unit	Description	Unit thickness (m)	Cumulative thickness (m)
13	**Limestone:** Medium to light grey weathering and very resistant unit that is the major cliff former along the ridge; medium planar but irregularly bedded fossiliferous (crinoidal) dark grey lime mudstone with some thin amphiporid packstone zones; some crinoidal and brachiopod-bearing skeletal wackestone beds near top of unit with some reworked lithostrotionella?-like colonial corals; crinoidal sediments appear to have infiltrated some noncrinoidal beds	36.0	1261.0
12	**Dolostone and limestone:** A colour banded unit weathering light grey and dark brownish grey and somewhat recessive; lower 20.0 m is strongly banded with brown, thick dolostone beds grading up to light grey dololaminite in typical Arnica cycles; a middle, resistant bluish grey limestone part of lime mudstone 6.0 m thick; the remainder is partly dolomitized lime mudstone; bluish grey limestone beds are mottled brown by dolomitization, thick, smooth bedded intervals alternate with thin bedded intervals; thick bedded intervals are preferentially dolomitized	93.0	1225.0
Total thickness of the Arnica Formation is 113.0 m.			
	Delorme Group		
	Tatsieta Formation		
11	**Limestone and dolostone:** Light grey weathering and a very resistant, prominent, cliff-forming unit; thin to thick, smooth planar bedded, dark brownish grey pelletal lime mudstone; a few thin interbeds of orange, platy, slightly argillaceous dolostone near base of unit; some penecontemporaneous mudflake breccias at the tops of some limestone beds outlined by yellow dolomite	124.0	1132.0
Total measured thickness of the Tatsieta Formation is 124.0 m.			
	Peel Formation		
10	**Dolostone:** Orange weathering and somewhat recessive unit; thin bedded and platy, silty yellow dololaminite with a few, thicker, blocky, orange, silty, homogeneous dolostones; silt laminae weather out in relief, mudcracks	63.0	1008.0
Total measured thickness of the Peel Formation is 63.0 m.			
Total thickness of the Delorme Group is 187.0 m.			
	Mount Kindle Formation		
9	**Dolostone:** A medium to dark brownish grey weathering and very resistant unit that forms a number of small peaks upslope; slightly siliceous, brownish grey dolostone in thin to thick, planar but rough weathering beds; intervals of thick beds stand up as small ridge-line summits beginning at 60.0 m and at 100.0 m; crinoids and silicified hemispheroidal stromatoporoids in thicker beds, thinner dololaminites are common between thick bedded intervals and at top of unit; a few yellow-stained beds near top of unit but upper contact is not exposed; this unit is less silicified than the underlying units	194.0	945.0
8	**Limestone:** Bluish grey weathering and moderately resistant unit; dark grey, thick bedded, lime mudstone with abundant potato-shaped nodules of grey chert	30.0	751.0
7	**Dolostone:** Dark brownish grey weathering and moderately resistant unit; thick bedded, brown, cherty dolostone; abundant silicified corals (cateniporids, *Syringopora* and others) and some orthoconic cephalopods	30.0	721.0
Total thickness of Mount Kindle Formation is 254.0 m.			
	Franklin Mountain Formation		
6	**Dolostone:** A medium to light grey, smooth weathering and resistant unit that extends up saddle to bench; medium planar to wavy bedded, light grey, finely crystalline, faintly laminated dolostone; some stromatolitic beds; upper part along the bench is thin bedded and platy; some laterally linked hemispheroidal stromatolites; yellow argillaceous material stains dolostones; massive and more argillaceous near top of unit	282.0	691.0
5	**Dolostone:** Medium to dark brownish grey and moderately resistant unit; grey weathering, medium grey, medium bedded, faintly crosslaminated grades upward in unit to dark brownish-grey laminite; unit extends up to low peak along ridge	228.0	409.0
4	**Dolostone:** Light to medium grey and slightly resistant unit; thin to thick cycles of medium to light grey, medium to thick bedded, finely crystalline dolostone that is faintly laminated; a series of thick, coarsely crystalline, strongly recrystallized vuggy beds near the top of the unit; thinner beds with smaller vugs, vugs probably leached biogenic material as some beds contain finely comminuted silicified skeletal fragments, mainly brachiopods; recrystallized beds appear to have been finely brecciated and contain white sparry dolomite	109.5	181.0
3	**Dolostone:** Light yellowish grey weathering and slightly recessive unit; rhythmically interbedded medium beds of medium grey dolostone with abundant pisolitic lenses and platy, thin bedded, yellow dololaminite, grey beds grade upward to yellow intervals; rip-up yellow clasts near the bases of darker beds; some stromatolites; this unit may correspond to the basal cyclic unit of the Franklin Mountain (Norford and MacQueen, 1975)	45.0	72.5
Total measured thickness of the Franklin Mountain Formation is 663.5 m.			

Unit	Description	Unit thickness (m)	Cumulative thickness (m)
	Katherine Formation		
2	**Sandstone and dolomitic sandstone:** Orange weathering and moderately resistant unit; dolomitic quartzarenite medium sandstone with limonitic burrow fillings; unit extends down to saddle	22.5	27.5
1	**Sandstone:** Silvery dark grey weathering and very resistant unit; blocky, very thick bedded, siliceous cemented, white quartzarenite	5.0	5.0

Incomplete thickness of the Katherine Formation is 27.5 m.

Total thickness of Section MTA-82-11 is 1415.0 m.

SECTION MTA-82-12 (57)

This section includes the Canol Formation and a large part of the Road River Group. It extends eastward along the headwaters of Trail River in the central part of the Trail River map area (106L). Unit 1 corresponds to the Rabbitkettle Formation; units 2 and 3 to Loucheux strata; units 4 and 5 to Dempster strata and units 6 and 7 to Vittrekwa strata, respectively, of the Road River Group of Cecile et al. (1982 and pers. comm.). Thicknesses are only approximate as folding and faulting on outcrop scale occur sporadically throughout the lower part of the section. The base of the section is at 66°24'44"N latitude and 135°28'36"W longitude.

	Canol Formation		
8	**Shale and chert:** Black and rusty weathering unit that is recessive in lower part but more resistant in upper part; a rather hard, rusty weathering, siliceous black shale in the lower part grades up in about 40.0 m to thin and very thin bedded, dark grey, rusty weathering, argillaceous chert; some yellow jarosite staining to lower shales; a horizon of barite nodules 0.5 m above the base of the unit, nodules about 1-2 cm across; some large nodules 1.0 m across near the top of the unit; recessive brown siltstones of the Imperial Formation abruptly overlie the Canol Formation; this unit disconformably overlies the underlying Road River strata	220.0	946.0

Total measured thickness of the Canol Formation is 220.0 m.

	Road River Group		
7	**Shale:** Black weathering and soft, a very recessive unit; a few, scattered, solitary, hard beds of resedimented detrital lime wackestones and packstones; some large nodules? near upper contact, the top 0.5 m is very soft with a prominent rusty band at the base of this interval; a few graptolites near the base of the unit	42.0	726.0
6	**Limestone and shale:** Yellowish grey weathering and slightly resistant unit that is a slight ridge former adjacent to valley; lower 10.0 m is a thin bedded, light yellowish grey, platy, argillaceous lime mudstone with some recessive, light grey, soft, calcareous shale intervals (1.0 m thick) that grades up to a resistant, prominent, ribbed, rhythmically bedded interval of grey, resistant, medium lime mudstone beds separated by recessive, dark grey and black shale; this unit and the overlying unit are mapped as the ЄDR4 unit of the Road River Formation of Douglas (1981) or as the Vittrekwa of the Road River Group of Cecile et al. (1982)	30.0	684.0
5	**Shale:** Black and rusty weathering and recessive unit; soft, noncalcareous, black, limonite-stained shale with a few solitary, hard, silty lime mudstone, medium-grey, thin beds with slightly irregular bed partings; abundant, faintly greenish grey burrows	17.0	654.0
4	**Siltstone and shale:** Light orangish yellow weathering and rather recessive unit but more resistant than overlying units; mainly light yellow weathering, light greenish grey, calcareous shale and argillaceous lime mudstone; bioturbated with slightly irregular bedding and scattered small (1-2 cm) barite nodules; some biserial? graptolites and *Tetragraptus*?; a few brachiopods; two intervals of very thin-planar bedded, orange weathering, dark grey, silty dolostone; a few solitary, thin granule conglomerate debris-flow beds of reworked orange dolostone fragments; this and the overlying unit 5 are mapped as the unit ЄDR3 unit of Douglas (1981) or as the Dempster of Cecile et al. (1982)	14.0	637.0
3	**Limestone and shale:** Light greyish yellow weathering, resistant, cliff forming unit along river; thin, smooth-bedded couplets of grey lime mudstone and yellowish grey shale; coarse sand-sized material occurs in thin, orangish-yellow weathering, silty bands at the base of some beds with some chitinous skeletal material (arthropod or inarticulate brachiopod fragments); section is broken by a major fault at the top of the unit	411.0	623.0
2	**Limestone and shale:** Same as overlying unit but contains some large, 1.0 m thick, resedimented, autochthonous slope breccias of deformed lime mudstone clasts in an orange silty matrix; the upper part of this unit is slightly more resistant because it contains groups of these mass-flow deposits; clasts range from undeformed to drastically rounded and folded; some thin lime mudstone beds have undergone boudinage with boudins surrounded by grey shale	114.0	212.0

Unit	Description	Unit thickness (m)	Cumulative thickness (m)
1	**Limestone and shale:** Light yellowish grey weathering and moderately resistant unit; dark grey, medium and thin, smooth beds of faintly laminated lime mudstone separated by recessive, black, calcareous, soft shale in recognizable couplets; a few grainstones patches in the scours at the bases of some beds; some trilobites and graptolites (*Dictyonema*?); units 1, 2 and 3 correspond to the ЄDR1 and ЄDR2 units of the Road River Formation of Douglas (1981); unit 1 also corresponds to the Rabbitkettle Formation and units 2 and 3 to the Loucheux of Cecile et al. (1982)	98.0	98.0

Incomplete thickness of the Road River Formation is 726.0 m.

Total thickness of Section MTA-82-12 is 946.0 m.

SECTION MTA-82-13 (9)

This section includes strata of the Road River and Canol formations and of the Bouvette Formation (ЄDb map unit). The Bouvette Formation includes beds equivalent to the Ogilvie and Mount Kindle formations. The section extends southward along Royal Creek on the west side of Royal Mountain in the south-central part of the Wind River map area (106E). The base of the section is at 65°03'17"N latitude and 135°09'15"W longitude. The section may be seen on RCAF air photos A:12291-110 and 111.

Canol Formation

9	**Silicified shale:** Dark greyish brown and rust-coloured weathering, recessive unit; thin bedded and calcareous chert in lower part grading up to siliceous black shale	50.0	784.5

Incomplete thickness of the Canol Formation is 50.0 m.

Road River Formation

8	**Shaly limestone:** Light grey to cream weathering, resistant unit that forms a high bluff and a bulge along the riverbank; lower part of unit is medium to thick bedded, light to medium grey, crinoidal wackestone and packstones containing abundant two-holed crinoids in thick intervals separated by thinner (0.5 m thick) intervals of dark grey, platy, argillaceous or shaly lime mudstone; the middle thick part is light grey weathering, bluish grey, medium to thick bedded lime mudstone with a few crinoidal beds; the uppermost 50.0 m composed of equal proportions of thin to very thin bedded, platy, shaly, dark grey lime mudstone and thin to medium light grey crinoidal beds; platy dark beds grade upward to light grey, thicker beds; the lowermost 20 m of this unit are similar to the upper part	224.0	734.5
7	**Limestone and shale:** Medium brownish grey weathering and recessive unit; medium grey, thin and very smooth bedded lime mudstone; somewhat silicified with dark grey chert laminae; platy with some flaggy bedded intervals, some coiled cephalopods with a goniatitic suture	75.0	510.5
6	**Shale:** Black weathering and very recessive unit; lower part very mushy weathering with a prominent, white gypsum efflorescence, calcareous with some rusty orangish brown weathering; upper part is more resistant, slightly silty and platy, very thinly laminated and contains orthoconic cephalopods with a goniatitic suture	60.0	435.5
5	**Shale and silty limestone:** Medium brownish grey weathering and recessive unit; lower part is relatively more recessive and prominently shale with a black shale at the base; middle part contains thick resistant ribs of silty medium grey, light greyish yellow weathering, faintly laminated lime mudstone; upper part is platy but irregular almost lenticularly bedded calcareous and silty brown shale, somewhat bioturbated; some tentaculites on bed parting surfaces and orthoconic cephalopods	101.0	375.5
4	**Shale and limestone:** Light to medium brownish grey weathering and recessive to slightly resistant unit that forms a bulge along the riverbank; a short interval of black, calcareous, soft shale at the base with thinly laminated, platy, silty, brown lime mudstone and some dark grey shale in lower 40.0 m; upper part is more resistant with thin to medium bedded, grey intervals of laminated silty lime mudstone separated by thin, platy intervals of bioturbated silty lime mudstone; several beds with abundant graptolites	126.0	274.5
3	**Shale:** Brown weathering and recessive unit with a few prominent ribs; laminated, very fissile, calcareous, brown, platy siltstone and silty shale with four, 1.0 m thick intervals of thin bedded, silty, faintly laminated, dark grey lime mudstone that is very hard and flaggy; some brachiopods and graptolites on the bed partings	42.0	148.5
2	**Shale:** Dark brown and recessive unit; largely covered by a vegetated alluvial fan; lithology probably the same as in the overlying unit	30.0	106.5

Total thickness of the Road River Formation is 658.0 m.

Bouvette Formation (ЄDb Map Unit)

1	**Limestone:** Light bluish grey and cream-coloured weathering and resistant unit that is a prominent cliff former along Royal Creek; medium to thick bedded, tan pelletal? wackestone with smooth bed partings; some rhythmically bedded intervals with thin beds grading up to thick beds; top 20 m are more irregularly bedded and are patchily dolomitized; some silicified cup corals; this unit may be the age equivalent of the top of the Mount Kindle Formation	76.5	76.5

Unit	Description	Unit thickness (m)	Cumulative thickness (m)
	Incomplete thickness of the Bouvette Formation (ЄDb map unit) is 76.5 m.		
	Total thickness of Section MTA-82-13 is 784.5 m.		
	SECTION MTA-82-14 (23)		
	This section includes strata of the Bouvette Formation (ЄDb map unit), the Road River, Michelle, Ogilvie and Canol formations. The section extends northward from the north flank of Mount Turner in the southeast part of the Hart River map area (116H). The base of the section is at 65°23'N latitude and 136°13'W longitude.		
	Canol Formation		
5	**Siliceous shale:** Silver- and rust-coloured weathering and recessive unit; black, platy, siliceous shale; typical Canol shale; unit extends along a bench and down to a saddle in the slope; this unit is overlain by siltstones, sandstones and conglomerates of the Imperial Formation	57.0	447.0
	Total thickness of the Canol Formation is 57.0 m.		
	Ogilvie Formation		
4	**Cherty limestone:** Medium bluish grey weathering and resistant unit that forms a series of low ridges; grey, thin to thick bedded, cherty lime mudstone and crinoid wackestone (two-holed crinoids); silicification outlines laminae within beds; some dominantly siliceous bands and elongate nodules weather orange or rust-coloured	81.0	390.0
	Total thickness of the Ogilvie Formation is 81.0 m.		
	Road River Formation		
3	**Dolomitic shale:** Brown weathering and recessive unit with little outcrop; brown, very thin bedded and platy, silty dolostone in scattered outcrops but most of slope dark greyish brown, dolomitic shale; a few thin to medium beds of cherty brown dolostone with scattered two-holed crinoids	111.0	309.0
2	**Shale:** Dark grey weathering and very recessive unit; this unit occupies a vegetated valley floor; scree of dark grey, fissile shale 114.0 198.0		
	Total measured thickness of the Road River Formation is 225.0 m.		
	Bouvette Formation (ЄDb map unit)		
1	**Limestone:** Light to medium bluish grey weathering and very resistant cliff-forming unit that marks the top of the Bouvette Formation; tan, medium to thick bedded pelletal wackestone; colonial corals (halysitids), *Maclurites* and orthoconic cephalopods are scattered throughout upper part of unit; many thin beds are separated by yellow dolomite silt partings; fenestral fabric occurs in some beds; planar, very continuous bedding; some beds near top of unit contain dolomitized burrow mottlings; dark grey chert nodules common near top of unit; this unit bears some similarity to the Mount Kindle Formation in the Mackenzie Mountains	84.0	84.0
	Incomplete thickness of the Bouvette Formation (ЄDb map unit) is 84.0 m.		
	Total thickness of Section MTA-82-14 is 447.0 m.		
	SECTION MTA-82-15 (16)		
	This section includes strata of the Bouvette Formation (ЄDb map unit) and the Road River Formation. The section extends northward down a mountain ridge about 6 km northwest of Mount Dempster in the southeast corner of the Hart River map area (116H). The base of the section is at 65°11'20"N latitude and 136°15'W longitude. The section is well shown on RCAF air photo A:13137-55.		
	Road River Formation		
7	**Argillaceous limestone and chert:** Dark grey weathering and moderately resistant to recessive unit that extends from the nose of the ridge down to the valley floor; dark grey, thin to medium bedded argillaceous and shaly lime mudstone with dark grey chert bands forms lower, more resistant 50 m of unit; upper part of unit is very thin bedded and platy argillaceous lime mudstone with abundant chert laminae; graptolites and trilobites occur along some bed surfaces	405.0	1171.0
6	**Siliceous limestone:** Dark grey weathering and recessive unit that extends along a vegetated saddle; dark grey siliceous and platy, very thin bedded argillaceous lime mudstone; this and the overlying unit are transitional in lithology between Road River formation and the ЄDb Map Unit	90.0	766.0
	Incomplete measured thickness of Road River Formation is 495.0 m.		

Unit	Description	Unit thickness (m)	Cumulative thickness (m)
	Bouvette Formation (ЄDb map unit)		
5	**Limestone:** Dark to medium bluish grey weathering and slightly resistant unit that is more recessive near the base of the unit; lower 60 m is very thin to thin bedded, dark grey lime mudstone with abundant black chert laminae; upper part of unit is medium to thick bedded dark grey lime mudstone that contains scattered nodules of black chert; this part of unit is rhythmically bedded with more recessive, thin to medium bedded intervals alternating with thick bedded intervals; very continuous "railroad track" type of bedding in upper part of unit	180.0	696.0
4	**Dolostone:** Light grey weathering and moderately resistant unit that leads downslope to a vegetated saddle; light grey, medium bedded, featureless, finely crystalline dolostone; mainly planar bedding but bed partings slightly irregular near base of unit and some chert in lower part of unit	222.0	516.0
3	**Dolostone:** Very light grey (almost white) weathering and moderately resistant unit; similar to overlying unit but a few very thick, vuggy beds at base	54.0	294.0
2	**Dolostone:** Dark grey weathering and very resistant unit that extends along ridge line; dark grey, thick to very thick bedded, mottled and vuggy finely crystalline dolostone; many dark grey beds have light coloured laminated upper parts; three chert-bearing beds, the uppermost of which appears to have replaced a bed of laterally linked hemispheroidal stromatolites	84.0	240.0
1	**Dolostone:** Light grey weathering and resistant unit; mainly light grey, medium to thick bedded, finely crystalline dolostone with interbeds of dark grey mottled dolostone; some dololaminite and some beds containing pockets of intraclast grainstone (white dolomite-cemented beachrock); a few thicker beds are vuggy	156.0	156.0

Incomplete thickness of the Bouvette Formation (ЄDb map unit) is 696.0 m.

Total thickness of Section MTA-82-15 is 1171.0 m.

SECTION MTA-82-16 (14)

This section includes strata of the Bouvette (ЄDb map unit) and the Road River formations. The section extends northward across a rather vegetated stretch of small hills underlain by recessive Road River shale and ends near the base of a resistant cliff of Ogilvie Formation about 3 km north of Pat Lake in the southeast corner of the Hart River map area (116H). The base of the section is at 65°07'42"N latitude and 136°38'54"W longitude. The section is well shown on RCAF air photo A:13137-161.

	Road River Formation		
6	**Limestone:** Light grey weathering and resistant unit that forms a prominent rib; light to medium grey, thick bedded coralline wackestone and boundstone; abundant chert and silicified corals including favositids and catenoporids; a few beds of crinoid wackestone occur at the top of the unit; this is a distinctly biostromal unit; this unit is separated by a shale-floored valley from the prominent cliff of the Ogilvie Formation on the north side of the valley	6.0	760.0
5	**Silicified siltstone:** Light brownish grey weathering and resistant unit that extends over a distinct hill; light to medium brownish grey, thin bedded silicified siltstone; a few platy, bluish grey bands of lime mudstone near top of unit; some graptolites	294.0	754.0
4	**Shale and limestone:** Medium yellowish grey weathering and recessive unit that extends between two low saddles; dark grey shale; some thin bedded, orange weathering dolostones at base of unit; some graptolites	141.0	460.0
3	**Shale and limestone:** Light brown to yellow weathering and slightly resistant unit that extends across two benches and over a hill; light grey and brown, silty and argillaceous, very thin bedded and laminated lime mudstone and calcareous shale; bands of black chert occur in some lime mudstone intervals; some brachiopods and biserial graptolites	180.0	319.0
2	**Shale:** Dark brownish grey weathering and recessive unit that is almost entirely tree covered; some intervals of thin bedded argillaceous lime mudstone	100.0	139.0

Incomplete measured thickness of the Road River Formation is 721.0 m.

	Bouvette Formation (ЄDb map unit)		
1	**Dolostone:** Light grey weathering and resistant unit that forms small cliffs along the side of a creek; light grey, medium bedded, finely crystalline, rather featureless dolostone with smooth, planar bed partings	39.0	39.0

Incomplete thickness of the Bouvette Formation (ЄDb map unit) is 39.0 m.

Total thickness of Section MTA-82-16 is 760.0 m.

Unit	Description	Unit thickness (m)	Cumulative thickness (m)

SECTION MTA-82-17 (5)

This section was measured about 6 to 8 km south of Mount MacDonald and extends eastward upstream along a tributary of Corn Creek in the central part of the Nadaleen River map area (106C). The base of the section is at 64°39'N latitude and 132°47'W longitude and is the continuation of Section 4 of Cecile (1982) which was measured at the same locality at the same time in the summer of 1977. The top of the section was revisited in 1982 and a faunal sample was taken of the topmost bed of the Silurian–Devonian carbonate map unit of Blusson (1974) in this section (see Appendix 2). The Emsian age of this sample indicates that the biostratigraphic range of the Silurian–Devonian carbonate map unit extends from Middle or Upper Silurian to upper Lower Devonian (Emsian) because upper Lower to Middle Silurian faunas (corals) were identified 30 to 40 m beneath the upper contact of the Mount Kindle Formation with the Silurian–Devonian carbonate map unit of this section (sample C-69423 *in* Cecile, 1982)

Silurian–Devonian carbonate map unit (Blusson, 1974)

Unit	Description	Unit thickness (m)	Cumulative thickness (m)
13	**Limestone:** Medium grey weathering and resistant cliff-forming unit; thick to very thick bedded and rough weathering; thick beds of mottled, dark greyish brown lime mudstone grade upward to slightly dolomitic, light grey, laminated lime mudstone in bedding cycles that are a metre to several metres thick; similar to unit 11 but not as dolomitic; fenestral fabric in lighter grey beds; the top of this unit is about (very approximately) 200 m below the top of the Silurian–Devonian carbonate map unit of Blusson (1974)	111.0	1368.0
12	**Dolostone:** Light grey to cream-coloured weathering and recessive unit; thin to medium bedded, smooth weathering dololaminite; laterally linked hemispheroidal stromatolites and fenestral fabric are abundant; some bed partings are slightly orange stained	114.0	1257.0
11	**Calcareous dolostone:** Medium grey weathering and moderately resistant bluff-forming unit; unit is strongly cyclic with thick to very thick bedded intervals of burrow-mottled, dark grey dolostone grading upward to light grey dololaminite with fenestral fabric; some laterally-linked hemispheroidal stromatolites at 1130.0 m; dololaminites are slightly yellow stained	225.0	1143.0
10	**Dolostone:** Medium brownish grey weathering and moderately resistant unit; thick beds of brownish grey, slightly mottled dolostone grade upward to thinner beds of light grey dolostone that are faintly laminated; darker beds tend to have erosional, sharp lower contacts with underlying lighter coloured beds;	93.0	918.0
9	**Dolostone:** Light to medium grey weathering and moderately resistant unit; thin to medium, lenticularly bedded medium grey dolostone; lenticular bedding may reflect deposition as small sand waves; a few laminated intervals with fenestral fabric	19.5	825.0
8	**Dolostone:** Cream-coloured weathering and poorly exposed recessive unit; thin to medium bedded, light grey dolostone and white dololaminite (similar to unit 7); a little orange stain in some beds	100.5	805.5
7	**Dolostone and limestone:** Light grey to cream-coloured weathering and moderately resistant, well exposed unit; thin to thick, very planar bedding; white dolostone with dololaminite intervals containing mudcracks and penecontemporaneously reworked mudchips; a few thin intervals of orange mottled, tan lime mudstone	90.0	705.0
6	**Dolostone:** Medium to light brownish grey weathering and resistant unit that forms a distinct topographic bench; thick beds of dark brownish grey, amphiporid-bearing dolostone alternate with lighter grey intervals; bedding rather poorly developed overall; this unit resembles Arnica Formation strata farther north and east	15.0	615.0
5	**Dolostone:** Medium to light grey and moderately resistant unit; thick to very thick beds of medium to dark grey amphiporid-bearing dolostone alternate with light grey to cream coloured, featureless dolostone imparting a striped or colour-banded appearance to the outcrop 172.5 600.0		
4	**Limestone:** Medium to dark grey weathering and recessive unit; medium bedded with wavy to irregular bed partings; medium to dark brownish grey, orange stained, slightly argillaceous lime mudstone and skeletal wackestone; abundant vermiform orange mottlings; abundant thamnoporid-like corals in some beds; local thick beds	42.0	420.0
3	**Limestone:** Light grey to bluish grey weathering and resistant, cliff-forming unit; thick to very thick bedded, tan to brown lime mudstone with many white-calcite-cement-filled vugs; a prominent metre-high cave-filling of megacrystalline white calcite cement occurs at 35 m above the base of the unit; some patches of sucrosic, white, medium crystalline dolomite occur in pods several metres broad	67.5	378.0
2	**Limestone:** Medium to dark grey weathering and recessive unit that is really a recessive marker horizon; thin to medium bedded, dark grey to black amphiporid wackestone; irregular bed partings and almost nodularly bedded	1.5	310.5
1	**Dolostone:** Very light grey weathering and moderately resistant unit; thick to very thick bedded, nearly white finely to medium crystalline dolostone; abundant small vugs and some solution collapse breccia fabrics; some thinner beds display faint relict laminae; this unit overlies about 850 m of limestone and dolostone that have been assigned to the Mount Kindle (about 310 m) and Franklin Mountain (about 540 m) formations, respectively (Section 4 of Cecile, 1982)	309.0	309.0

Incomplete thickness of the Silurian–Devonian carbonate map unit is 1368.0 m.

Unit	Description	Unit thickness (m)	Cumulative thickness (m)
	SECTION MTA-84-1 (53)		
	This section was measured about 2 km east of Blackstone River and extends northward across the front ranges of the Ogilvie Mountains. It includes strata of the Road River, Michelle, and Ogilvie formations. The base of the section is at 65°41'N latitude and 137°26'W longitude. It is well shown on RCAF air photo A:13489-114.		
	Ogilvie Formation		
18	**Limestone:** Light grey weathering and very resistant unit; thick to very thick planar and continuous bedding; light brown to medium grey stromatoporoid- and coral-bearing skeletal lime wackestone; wackestone matrix commonly contains crinoids; bed partings are irregular rather than smooth; beds in middle of unit are very thick and massive and contain abundant hemispheroidal stomatoporoids and colonial corals in colonies up to 0.3 m across, with many scattered thamnoporid-type corals; some of this unit may be a stromatoporoid or coralline boundstone; this unit is the uppermost resistant unit of the Ogilvie that outcrops as well defined "flatirons"; talus from these beds covers the contact between the overlying Canol Formation which overlies the Ogilvie Formation	20.0+	1150.0+
17	**Limestone:** Light to medium grey weathering and very recessive unit; poorly defined medium to thick planar bedded with irregular partings; dark grey lime mudstone, pronounced nodular fabric with curvilinear argillaceous partings; many beds in this interval display well developed cleavage; very rubbly talus	28.5	1130.0
16	**Limestone:** Light grey weathering and very resistant unit; thick to very thick planar bedded with well defined bed partings; greyish brown to light brown (tan) lime mudstone and/or pelletal wackestone; a few very thick beds contain abundant hemispheroidal stromatoporoids and colonial corals (*Favosites*); some beds contain abundant slightly silicified Thamnoporid-like corals and other skeletal fragments; this unit is a major cliff former in the Ogilvie Formation	21.0	1101.5
15	**Limestone:** Medium grey weathering and moderately resistant unit that forms a relatively recessive band between two more resistant units; medium to thick bedded, dark grey, nodular, crinoid-bearing lime mudstone in lower part of unit grades upward to lighter grey, medium and thick bedded coralline and stromatoporoid boundstone higher in unit; hemispheroidal or globular stromatoporoids are abundant; silicified faunas in upper beds	52.5	1080.5
14	**Limestone:** Light to medium bluish grey weathering and very resistant cliff-forming unit; thin to very thick, planar bedded, dark grey crinoidal wackestone (some two-holed crinoids) with common corals including *Favosites* and thamnoporid-type corals; some brachiopods, relatively thick intervals of very thick beds alternate with thinner, thin bedded intervals imparting a pronounced ribbed appearance to the unit and forming a series of small cliffs	60.0	1028.0
13	**Limestone:** Light grey weathering and resistant unit; like unit 14, this unit forms a ragged series of small cliffs but no large cliffs; thin bedded platy intervals alternate with thick bedded intervals; light brown lime mudstone and/or pelletal wackestone; units 13 and 14 resemble strata of the Landry Formation in the Snake River map area (106 F)	111.0	968.0
12	**Limestone:** Colour banded weathering pattern of light and medium grey alternating with medium greyish brown and moderately resistant unit that forms a flat part of the ridge line; intervals of very thin bedded, laminated, light brown (cream coloured) dolomitic lime mudstone alternate with thin to medium bedded bluish grey weathering brown lime mudstone with some mottled beds containing partly dolomitized brown mottlings (burrows?); small, tabular rip-up clasts of light laminae in darker brown laminations are common in the laminated intervals	88.5	857.0
11	**Limestone:** Medium grey weathering and very resistant unit that forms the second largest cliffs in this section; medium- to very thick-planar continuous bedded with somewhat irregular bed partings; medium brown crinoidal wackestone with some crinoidal packstones; some two-holed crinoids; the lack of thin bedded intervals in this unit may be a factor in its comparative resistance to weathering	180.0	768.5
10	**Limestone:** Medium to light brownish grey weathering and moderately resistant unit but not cliff-forming; thin to medium planar but irregular bedded, dark brown, crinoid-bearing lime mudstone with two intervals (1-2 m thick) of laminated lime mudstone as in unit 9; the top of this interval occurs at a fault of small displacement and is visible toward the west as a small fold	78.0	588.5
9	**Limestone and dolomitic limestone:** Light grey weathering and less resistant unit that diplays a smooth weathering profile along the ridge and extends down to a saddle; very thin to thin smooth and planar bedded, light grey, light brown and light brownish-grey lime mudstone and laminated lime mudstone; some small, calcite-spar-filled vertical burrows; platy and flaggy talus	49.5	510.5

Unit	Description	Unit thickness (m)	Cumulative thickness (m)
8	**Limestone:** Medium to light grey weathering and extremely resistant unit; this is the major cliff-forming unit in this section and it forms a single massive cliff that dominates the ridge; medium continuous but lumpy bedded in lower part passes upward in 15.0 m to a very thick, planar bedded sequence; the upper 10 to 15 m of unit is merely thick bedded and is correspondingly less resistant; medium and dark grey crinoidal lime wackestone in lower beds (some two-holed) passes upward to coral- and stromatoporoid-bearing crinoidal wackestone in the very thick beds; some brachiopods; *Favosites* and tabular and globular stromatoporoids are common	54.0	461.0
	Dolomite Member		
7	**Dolomitic limestone:** Medium to dark grey and brownish-grey weathering and moderately resistant unit; only scattered partial outcrop, but unit forms a series of benches leading up to the cliff of unit 8; medium to thick continuous planar bedded with irregular partings; dark grey lime mudstone with many intervals, colour mottled with greyish brown dolomitic mottling; crinoidal wackestone (two-holers) dominates upper part of unit, six or seven solitary beds of amphiporid floatstones or wackestone in the upper part of unit; thin and medium bedded intervals tend to alternate with thick bedded intervals in upper parts	214.5	407.0
6	**Dolomitic limestone:** Light grey to yellowish grey weathering unit that is neither recessive nor resistant; a scree slope with little in-place outcrop; thin to medium bedded and smooth weathering (cream coloured) light yellowish-grey, aphanocrystalline, dolomitic lime mudstone; commonly colour laminated with light and dark brownish grey and yellowish grey laminae; tabular rip-up clasts of lighter coloured laminae (up to 3 cm long) incorporated in some darker beds; zones of laminoid fenestral fabric alternate with laminated zones within single beds; some laminated beds contain abundant reworked light grey laminite chips in a matrix of darker grey carbonate; some poorly developed mudcracks developed on yellow stained bed surfaces of some beds; a few rather spiny weathering, thick, bluish grey weathering, dark grey crinoidal wackestone beds near top of unit	37.5	192.5
5	**Dolostone:** Very light grey and yellowish grey weathering and moderately resistant unit of mainly broken outcrop; unit forms a bench in the ridge line; smooth weathering, planar, thin to thick continuous bedded, light yellowish grey finely crystalline to aphanocrystalline dolostone; a dolomitized lime mudstone; many zones of well developed laminoid fenestral fabric; some thin, yellowish orange, platy, thin beds that cap some medium thick beds; sharp upper contact with a solitary limestone bed at the base of unit 6	52.5	155.0
4	**Limestone:** Light grey weathering and moderately resistant unit with small outcrops in the middle of the large gully that includes the underlying four units; thick bedded with continuous, broadly undulatory smooth partings light grey pelletal? grainstone and packstone (0.1 cm-sized brown ovoids cemented by calcite spar?); discontinuous partings within beds; many thick beds (e.g., at 27.0 m above base of unit) display a pronounced brown mottled pattern; individual mottles are ovoid in cross-section (burrows)	30.0	102.5
Total measured thickness of the Dolomite Member is 334.5 m.			
Total measured thickness of the Ogilvie Formation is 1077.5 m.			
	Michelle Formation		
3	**Limestone:** Medium greyish brown weathering and moderately resistant unit that forms small outcrops in gully; lime mudstone with sparse crinoids; medium planar continuous bedding with irregular argillaceous partings; little fauna apparent	26.0	72.5
2	**Argillaceous limestone:** Medium brown weathering and recessive unit; vegetated, but with continuous outcrop; dark brown, thin to very thin bedded fossiliferous lime mudstone with irregular and argillaceous bed partings; partings tend to be yellowish brown; small feeding trails are abundant along some bed surfaces; a diverse shelly fauna of small brachiopods, ostracodes, tentaculites, bryozoans and crinoids and finely comminuted shell fragments; a few less fossiliferous and thicker beds toward the top of the unit	10.5	46.5
1	**Argillaceous limestone:** Medium brown weathering and recessive unit; most of this unit is covered but surface debris is platy, dark brown, fossiliferous lime mudstone similar to that of unit 2; this unit is underlain by the soft grey shales of the Road River Formation	36.0	36.0
Total measured thickness of the Michelle Formation is 72.5 m.			
Total thickness of Section MTA-84-1 is 1150.0 m.			

SECTION MTA-84-2 (50)

This section was measured about 14 km east of the Blackstone River and extends northward across two major ridges of the front ranges of the Ogilvie Mountains. The section includes strata of the Bouvette (ЄDb map unit), the Road River, Michelle, and Ogilvie formations and was measured across a structural panel of lower Paleozoic strata that forms the hanging wall of the Carter Fault. The base of the section is at 65°40'N latitude and 137°12'W longitude. The section is well shown on RCAF air photo number A:13138-43.

	Ogilvie Formation		
17	**Limestone:** Dark grey weathering and recessive unit; probably medium to dark grey lime mudstone but most of this unit is covered; upper contact is at a fault; (see last part of unit 16 description)	100.0	1761.5

Unit	Description	Unit thickness (m)	Cumulative thickness (m)
16	**Limestone:** Light bluish grey weathering and very resistant cliff-forming unit that displays the second most prominent series of erosional flatirons in this section; thick and very thick planar bedded, medium to dark grey, crinoidal wackestone with many two-holed crinoids; bed partings irregular but not as distinct as in unit 15; some beds definitely biostromal and contain abundant, slightly silicified colonial corals (*Favosites*) and stromatoporoids; this unit appears to correlate with the second most prominent cliff forming unit (unit 11) of Section MTA-84-1; the Ogilvie continues for about 100 m above this unit up to a fault contact	60.0	1661.5
15	**Limestone:** Light grey weathering and moderately resistant unit that forms a relatively recessive, continuous dip slope between more cliff-forming units; well developed planar, very continuous, mainly thin to medium bedded; light to medium brown (tan) lime mudstone and/or pelletal wackestone; the lower 1/3 of this unit is slightly more resistant than the upper part and contains numerous thicker beds up to one metre thick; many beds in the lower part display a dark grey mottled pattern that may be due to partial dolomitization; some fenestral fabric in lower part, beds in upper part tend to be featureless	127.5	1601.0
14	**Limestone:** Medium brownish grey to light bluish grey weathering and moderately resistant unit in lower part becoming very resistant and cliff-forming upper part; medium to thick bedded with undulatory argillaceous bed partings; slightly argillaceous dark brownish grey limestone that appears unfossiliferous, this grades upward to thick and very thick bedded medium dark grey crinoid-bearing lime mudstone (some two-holed crinoids) with little or no argillaceous material; lower two thirds of unit 14 is nodular	69.0	1474.0
13	**Limestone:** Medium bluish grey weathering and very resistant cliff-forming unit that, combined with unit 12, forms the most prominent series of cliffs in the Ogilvie Formation of this section; thick to very thick continuous bedded (some 2 to 3 m thick beds) with a blocky to massive parting; medium brown lime mudstone and crinoidal wackestone, one solitary and strikingly recessive 1.5 m thick interval of thin, nearly nodularly bedded lime mudstone at 20.0 m; many large in-place colonial corals (*Favosites*, and corals similar to *Lithostrotion*); this unit forms the crest of the east–west-trending ridge formed by the Ogilvie Formation	67.5	1405.0
12	**Limestone:** Medium bluish grey weathering and resistant cliff-former that forms part of the lower cliffs of the Ogilvie Formation; medium greyish brown lime mudstone; thin to medium bedded recessive intervals (1 to 2 m thick) of dark brownish grey, very hard (possibly siliceous) lime mudstone alternating with thicker intervals (2 to 4 m thick) of thick to very thick bedded, medium grey, sparsely crinoidal lime mudstone containing a few colonial coral heads; many thin bedded intervals sharply overlie thick beds and grade upward to thicker beds but gradational contacts between thin and thick bedded intervals are more common	40.5	1337.5
11	**Limestone:** Medium bluish grey weathering and slightly to moderately resistant unit formed of a series of small outcrops leading up to main cliff of the Ogilvie Formation; a prominent dark brownish grey mottled pattern in many beds; medium greyish brown lime mudstone; five or six solitary brown beds of partly dolomitized amphiporid floatstone or wackestone; a few beds contain abundant ramose colonial corals similar to *Thamnopora*; a few small colonial coral heads occur in the thicker beds; the mottled pattern is due to partial dolomitization	42.0	1297.0
	Dolomite Member		
10	**Limestone and dolostone:** Bluish grey weathering and slightly recessive unit; this is a nearly totally scree-covered unit that contains only a few in-place outcrops and is less resistant than overlying units but more so than the underlying Michelle Formation; blocky and flaggy talus of light and medium grey lime mudstone and flaggy to platy talus of light greyish yellow (cream coloured) to light brown aphanocrystalline dolostone; the unit may be subdivided into four parts; a lowermost part with a relatively shallow slope contains a larger proportion of dolostone and above this is a steeper part in which limestone predominates; above these two subunits is a similar two-part sequence of dolostone and limestone; most of the dolostones are finely colour laminated, and spectacular 10 to 20 cm thick zones of laminoid fenestral fabric are abundant; the lowermost subunit contains what appears to be few, large concretionary masses (spheroids 1 to 2 m across?) of fetid dark brown lime mudstone whose lithology is reminiscent of the underlying Michelle Formation; some solitary medium beds of limestone in the uppermost subunit of this unit contain abundant amphiporids	455.0	1255.0
Total measured thickness of the Dolomite Member is 455.0 m.			
Incomplete thickness of the Ogilvie Formation is 861.5 m.			
	Michelle Formation		
9	**Argillaceous limestone:** Medium to dark brown weathering and recessive unit; most of this unit is vegetated talus; dark brown and grey, thin bedded, platy, argillaceous, fossiliferous lime mudstone with very smooth and planar bed partings; scattered beds contain a diverse fauna of brachiopod, trilobite and crinoid fragments; occasional medium-graded skeletal wackestone beds with scoured bases that may be turbidites	105.0	800.0
Total thickness of the Michelle Formation is 105.0 m.			

Unit	Description	Unit thickness (m)	Cumulative thickness (m)
	Road River Formation		
8	**Shale:** Dark grey weathering and very recessive unit; this unit occupies the valley floor and is almost entirely vegetated; small amounts of platy, dark grey shale unearthed by rodents on the valley floor; thickness of unit measured from air photo	290.0	695.0
	Total measured thickness of the Road River Formation is 290.0 m.		
	Bouvette Formation (ЄDb map unit)		
7	**Limestone:** Light grey weathering and resistant cliff-forming final dip slope of the ЄDb map unit; intervals of thick bedded, light grey lime mudstone are separated by thin bedded, more recessive intervals of darker grey lime mudstone; near vertical bedding has a very prominently “ribbed”, weathering profile; uppermost beds contain abundant, silicified, cateniporid-like colonial corals and solitary corals (*Bighornia*?) as well as orthoconic cephalopods	90.0	405.0
6	**Limestone:** Light grey weathering and resistant cliff-forming unit that forms a bench and dip slope down to overlying unit; light grey, thick bedded lime mudstone (pelletal?) with smooth, planar bed partings; patches of white dolomite-cemented crackle breccia are common in the lower part of the unit	51.0	315.0
5	**Calcareous dolostone:** Light to medium grey weathering and resistant unit; medium grey, medium bedded dolostone with planar bed partings; featureless in lower part of unit but upper part is colour mottled light and dark grey and is calcareous; some penecontemporaneous rip-up clasts along the bases of some beds	15.0	264.0
4	**Dolostone:** Dark brown weathering and resistant unit; dark brown, medium to thick bedded finely to medium crystalline dolostone; bands of nodular black chert are common; irregular bed partings and distinctly lumpy bedding; organic-rich dolostone (bituminous odour); this unit is mapped as a tongue of the Road River Formation in the ЄDb map unit (Douglas, 1982)	51.0	249.0
3	**Dolostone:** Medium brownish grey to grey weathering and resistant unit; medium to thick bedded, medium grey, finely to medium crystalline dolostone; similar to unit 1 but not as strongly colour banded; light grey bands are medium bedded dololaminites or are associated with dololaminites; many beds vaguely mottled, some beds contain distinct fragments that may represent redeposited lime mudlumps in a lime mud matrix; a few zones of crackle breccia cemented with white dolomite; a few scattered grey chert nodules	75.0	198.0
2	**Dolostone:** Dark brown weathering and recessive unit that extends across a vegetated saddle in the ridge line; dark brown, thin to medium bedded finely to medium crystalline, organic-rich dolostone; vague, discontinuous colour laminae in most beds; many zones of rather indistinct crackle breccia, cemented with white dolomite, are scattered throughout; some beds almost appear to be formed of an agglomeration of ovoid carbonate mud lumps; upper part of unit is thicker bedded and more distinctly brecciated, with brecciated zones formed of both crackle and rubble packbreccias	90.0	123.0
1	**Dolostone:** Light grey weathering and very resistant unit that begins at the summit of a ridge and leads downward toward the saddle occupied by unit 2; light grey, medium to thick bedded finely crystalline dolostone; medium bedded intervals contain abundant light grey to white dololaminite (algal?); thin zones of white, dolomite-cemented pisolite packstone are scattered throughout; a few, very distinctive lenses of imbricated lime mudclasts of probable beachrock origin; these lense are about 1 m across and up to 30 cm thick; several zones and cavity-fillings of coarse, angular fragments cemented by megacrystalline white calcite	33.0	33.0
	Incomplete thickness of the Bouvette Formation is 405.0 m.		
	Total thickness of Section MTA-84-2 is 1761.5 m.		

SECTION MTA-84-3 (48)

This section is located about 2 km west of Hart River and extends northeast across the front range of the Ogilvie Mountains. It includes strata of the Road River, Michelle, and Ogilvie formations. This section includes the type section of the Michelle Formation (Norris, A.W., 1968b). The base of the section is at 65°39' latitude and 136°46' longitude. The section is well shown in RCAF air photo number A:13489-114.

	Ogilvie Formation		
10	**Limestone:** Medium grey weathering and slightly recessive unit that forms a vegetated dip slope; thinly and irregularly to nodularly bedded crinoidal lime mudstone; only the lower few metres of the unit are exposed; the upper contact of the Ogilvie Formation with the immediately overlying Canol Formation is covered by vegetation	20.0	572.0
9	**Limestone:** Light grey weathering and moderately resistant unit that leads up to the summit and down the dip slope north of the main ridge summit; medium to thick, very continuous planar bedded with smooth bed partings; light grey lime mudstone (pelletal wackestone?) as in underlying units; some laminoid fenestral fabric in almost every bed	58.5	552.0
8	**Limestone:** Medium grey weathering and resistant unit; a single resistant prominent cliff band in an otherwise uniformly resistant slope; thick bedded lime mudstone (pelletal?) with poorly developed but common fenestral fabric	15.0	493.5

Unit	Description	Unit thickness (m)	Cumulative thickness (m)
7	**Limestone:** Light grey weathering and moderately resistant unit that forms a series of small cliffs that are relatively recessive compared to underlying strata of the Ogilvie Formation; medium grey to light brown (tan) lime mudstone (pelletal wackestone?) displaying abundant fenestral fabric; this unit is formed of several, slightly more resistant, thick bedded ribs or cliffs separated by more recessive intervals of 0.5 to 1.0 m thick continuous, thin beds of laminated, slightly dolomitic lime mudstone containing a coarse laminoid fenestral fabric; crinoid-bearing lime mudstone at the base of some thick beds grades upward to laminoid fenestral fabric; this unit and the overlying units of the Ogilvie comprise the upper recessive part of the Ogilvie Formation	78.0	478.5
6	**Limestone:** Light grey weathering and very resistant massive weathering and cliff-forming unit in three separate minicliffs; very thick bedded, medium grey, crinoidal wackestone with scattered globular stromatoporoids; some stromatoporoids appear to be locally concentrated; trilobites and horn corals at 24.0 m; top of lower cliff at 30.0 m; spectacular globular and loaf-shaped stromatoporoids and large (1.0 m across) spheroidal heads of *Favosites* at 30 to 40 m (probably a large proportion of this interval is a stromatoporoidal boundstone but many stromatoporoids are not in growth position); one 0.5 metre thick zone of fenestral fabric caps this interval; the top of this cliff appears to be slightly displaced along strike (possibly by cross faults)	82.5	400.5
5	**Limestone:** Light bluish grey weathering and very resistant unit that forms a prominent, massive cliff; very thick bedded, medium grey, crinoid-bearing lime mudstone with some two-holed crinoids; entire unit is formed of three very thick beds; some indistinct mottling and breccia in lower part in which light-coloured clasts occupy a darker matrix (very poor colour contrast between clasts and matrix); a few angular clasts but most are rounded and indistinct; in a few places yellowish brown sediment reminiscent of Michelle lithologies forms some of the interfragment matrix	21.0	318.0
Total measured thickness of the Ogilvie is 275.0 m.			
	Michelle Formation		
4	**Limestone:** Medium cream-coloured to grey weathering and moderately resistant unit; medium bedded, brownish grey, slightly argillaceous lime mudstone; incipient nodular bedding; some thicker beds appear to be sedimentary breccias in which there is a low colour contrast between the brownish grey matrix and the grey lime mudstone fragments; fragments up to 30 cm long; gentle scour and fill type crossbedding; this unit is transitional in aspect between strata typical of the Michelle and Ogilvie formations	18.0	337.5
3	**Argillaceous limestone:** Brownish grey weathering and moderately resistant unit; partly vegetated with small cliff outcrops, but less resistant than overlying unit; brown, thin to medium bedded, argillaceous, fossiliferous lime mudstone and skeletal wackestone; fossiliferous material includes brachiopod, trilobite and ostracode fragments; this sequence is punctuated with solitary, very thick, grey to brownish grey beds of rubble floatbreccia; angular, equant to tabular clasts of light grey, crinoidal lime mudstone are suspended in a matrix of brownish grey, argillaceous lime mudstone; base of unit is marked by a single 3.0 to 4.0 m thick bed of light grey crinoidal wackestone that is a crackle breccia infiltrated with brown, argillaceous lime mud typical of the Michelle Formation; this bed contains abundant hemispheroidal stromatoporoids and favositid-type corals that appear to have rolled into their present positions; the incipient breccia fragments of the crackle breccia appear to have been deformed plastically	40.5	319.5
2	**Argillaceous limestone:** Brown weathering and slightly resistant unit; lower part of unit forms small cliffs; brownish grey, argillaceous and thin to thick bedded fossiliferous lime mudstone and skeletal wackestone; almost rhythmically bedded, with more resistant thick beds alternating with relatively recessive thin bedded and laminated intervals; skeletal fragments tend to be oriented parallel to bedding and include brachiopod, trilobite and ostracode fragments; one favositid-type coral observed at 30.0 m above base of unit	165.0	279.0
Total measured thickness of the Michelle Formation is 223.5 m.			
	Road River Formation		
1	**Argillaceous limestone and shale:** Dark grey weathering and very recessive unit; mainly vegetated and scree-covered; platy, dark grey, sooty, argillaceous lime mudstone; a few sparsely fossiliferous thin lime mudstone beds containing flattened brachiopods	114.0	114.0
Incomplete thickness of the Road River Formation is 114.0 m.			
Total thickness of Section MTA-84-3 is 572.0 m.			

SECTION MTA-84-4 (47)

This section includes strata of the Road River, Michelle and Ogilvie formations. It extends northeastward along the west bank of Hart River in the east central part of the Hart River Map area (116H) about one km east of section MTA-84-3. The base of the section is at 65°38'N latitude and 136°43'30"W longitude. The section is well shown on RCAF air photo A:13137-152.

Unit	Description	Unit thickness (m)	Cumulative thickness (m)
	Ogilvie Formation		
8	**Limestone:** Medium grey weathering and resistant unit; similar to unit 7 but clasts are sparse (about 15% total) and are up to 0.5 m in diameter (crinoidal packstone in composition); bedding is thick with poorly developed partings; chert replacement occasional with possible chert clasts (or may be replaced lime mudstone clasts); more argillaceous upsection and breccia character changes gradually upsection into sparsely fossiliferous lime mudstone flows; at 22.0 m laminated calcareous shale interbeds up to 30 cm thick; upper contact gradational over a short distance with silicified shale of the Canol Formation	57.0	543.0
7	**Limestone:** Medium grey weathering and resistant unit; very thick bedded, dark grey particulate rubble pack and float breccia; poorly sorted clasts up to 30 cm diameter of tabular, dark grey lime mudstone and equant, subrounded, crinoidal wackestone and packstone; occasional fragments of corals and stromatoporoids; matrix is dark grey crinoidal lime mudstone; unit has more floatstone breccia character upsection	38.0	496.0
6	6 **Limestone:** Medium grey weathering and moderately resistant unit that weathers in a prominent ribbed pattern; similar to unit 7 but bedding is medium with more regular chert horizons; lime mudstone is dominant with local poorly graded fossiliferous lime mudstone flows; bedding is planar and continuous; local, thin, recessive intervals of very thin bedded shale and lime mudstone	40.0	458.0
5	**Limestone:** Dark to medium grey weathering and moderately resistant; thick bedded, dark grey encrinite debris flows and crinoidal wackestones; argillaceous mottlings with overturned colonial corals and hemispheroidal stromatoporoids (15 cm diameter) in lower third of unit; debris flows occasionally grade upward into lime mudstones and display pronounced graded bedding; these encrinite flows contain brachiopod and coral fragments and subangular to subrounded lithoclasts (not as fossiliferous as matrix); matrix is almost a packstone; silicification along beds is common; at 20 m, thick bedded encrinites (two-holed crinoids common) with interbeds of dark grey weathering fossiliferous lime mudstone; encrinites have scoured bases; beds vary from 8 cm to 1 m in thickness and have irregular to wavy bed partings (almost sigmoidal); from 36 to 37 m, silicification occurs subparallel to bedding as irregular lenses and stringers resulting in black chert bands up to 2.5 cm thick (average 1 cm); scouring at bases of flows common; bedding is massive to thick with poorly developed, discontinuous partings	51.0	418.0
4	**Limestone:** Rusty dark-grey weathering and resistant, cliff forming unit; dark grey, skeletal and intraclast rudstone and packstone with thin to thick, wavy and planar bedding; many graded crinoidal debris flows of dark grey crinoidal packstone (abundant two-holed crinoids) with dark, irregular silicification parallel to bedding; the contact between the Ogilvie and the underlying Michelle Formation is not distinct	75.0	343.0
Total measured thickness of the Ogilvie Formation is 275.0 m.			
	Michelle Formation		
3	**Argillaceous limestone:** similar to underlying unit but more resistant; a few thick beds of rubble floatbreccia with light grey, angular, but plastically deformed clasts of crinoidal lime mudstone in a matrix of greyish brown argillaceous lime mudstone; unit tends to be medium to thick bedded but beds contain a well developed platy to flaggy parting	120.0	268.0
2	**Argillaceous limestone:** Brownish grey weathering and slightly resistant unit that is less resistant than overlying unit; most of unit is argillaceous and sooty thin bedded, platy and sparsely fossiliferous lime mudstone; robust brachiopod shells are abundant as lag deposits along the bases of some beds; some thin beds of skeletal wackestone containing brachiopods and trilobites; thick, resistant and broadly undulatory beds of grey lime mudstone punctuate the sequence, particularly toward the top of the unit; the thick beds have flaggy, discontinuous intrabed partings and are faintly laminated	48.0	148.0
Total measured thickness of the Michelle Formation is 168.0 m.			
	Road River Formation		
1	**Calcareous shale:** Black weathering and very recessive unit; fissile, sooty black shale with a planar to lenticular parting; scattered thin to medium resistant beds of sooty lime mudstone punctuate the upper part of the unit; abundant conulariids on bed surfaces; some thicker beds contain diverse fauna of brachiopods, trilobites and fenestellid bryozoans	100.0	100.0
Incomplete thickness of the Road River Formation is 100.0 m.			
Total thickness of Section MTA-84-4 is 543.0 m.			

SECTION MTA-84-5 (49)

This section includes strata of the Michelle and Ogilvie formations. This section, like Section MTA-84-2, extends northward across part of the hanging wall of the Carter Fault in the central part of the Hart River map area (116H). The base of the section is at 65°39'N latitude and 136°48'30"W longitude. This section is well shown on RCAF air photo A:13137-153.

Unit	Description	Unit thickness (m)	Cumulative thickness (m)
	Ogilvie Formation		
9	**Limestone:** Medium grey weathering and recessive unit that extends down dip slope to the contact with the overlying Canol Formation; only scattered outcrop; uneven, very thick bedded, dark grey, fossiliferous lime mudstone; crinoids and brachiopods, concretions common on bedding planes; *Alveolites*? in growth position; at 9 m, medium bedded rubble breccia with very dark grey, subangular to subrounded lime mudstone clasts in a crinoidal wackestone matrix and a few clasts of crinoidal packstone; between 15 to 35 m, more black lime mudstones with or without fossils, local crinoidal packstones; unit has local chert nodules/replacement increasing upsection; fossil content decreases upsection	48.0	406.5
8	**Limestone:** Medium grey weathering and resistant unit; basal 2 m weathers medium to dark grey and is a thick bedded, fetid, dark grey to black sparsely crinoidal lime mudstone containing tension fractures filled with sparry calcite; upsection beds become medium grey, locally with platy intervals; fenestral fabric occurs upsection from 10 m; crinoidal lime mudstone; some intraclast breccias at 19 m.; upsection from 20 m, fenestral fabric diminishes (but does not disappear) and the dominant lithology is very thick bedded, brown grey lime mudstone	60.0	358.5
7	**Limestone:** Light grey weathering and only slightly resistant unit; medium to thick bedded, medium to light grey, unfossiliferous lime mudstone with rare, platy interbeds containing ostracodes	30.0	298.5
6	**Limestone and dolomitic limestone:** Light to yellowish grey weathering and relatively recessive unit; platy and thin bedded; common thicker interbeds of unfossiliferous, fenestral, dark grey lime mudstone; occasional interbeds of yellow weathering, platy, argillaceous, dolomitic lime mudstone; rarely reworked, poorly to moderately well graded intraclast breccias occur within the platy limestones; at 8.0 m, medium bedded, orange grey weathering and mottled lime mudstone in beds up to 1 m thick; mottling may be burrow infill from upper beds; stromatoporoids found on bedding planes in growth position; burrow traces on bedding planes; at 26 m., bedding gradually thickens upsection to medium bedded with platy fenestral intervals still common; proportion of calcareous beds increases upsection; possible mudcracks	48.0	268.5
	Dolomite Member		
5	**Dolostone:** Very light grey weathering and moderately resistant (slightly less than unit 4); mainly continuous planar medium bedded with local thick beds; light grey, microcrystalline dolostone; fenestral fabrics common in thinner beds and occur locally in thick beds; moldic porosity in thicker beds; at 18 m is a small, 4 m thick bluff-forming interval of thick beds; at 24 m, common fenestral fabric in float, occasional reworked intraclast (mudchips) breccia dolostones; along the ridge fenestral fabric is common and occasional laminated dolostones in beds up to 30 cm thick occur; upsection the beds are thinner bedded such that thin to medium beds with planar, continuous partings dominate; occasional beds (platy) of fenestral and slightly convoluted laminated dolostone; at 42 m, poorly developed mudcracks? emphasized by pale orange staining; very pale orange weathering common in these beds	51.0	220.5
4	**Dolostone:** Medium to dark grey weathering and moderately resistant unit; very thick bedded and similar in character to unit 3 except for grey mottling which decreases upsection; medium grey, finely crystalline dolostone; rare vug development; at 30 m, moldic porosity development common; molds appear to be crinoid stems and fossil fragments; bulbous and layered stromatoporoids (calcareous) are commonly overturned and occur with, and rarely encrust, solitary horn corals; matrix is dolomite; from 36 to 45 m, laminoid fenestral fabric is abundant; poorly to moderately well developed; continuous to smooth planar bedded, finely crystalline dolostone, slightly recessive where fenestral fabric occurs in this interval; at 45 m, a 1 m thick interval of thin, poorly bedded, microcrystalline dolostone, faintly laminated and stylolitic; orange and yellow staining parallel to bedding may indicate an exposure surface, and stromatoporoids in growth position immediately overlie this exposure surface; at 51 m, which is the top of the resistant interval, there is good development of fenestral fabric; stromatoporoids decrease in abundance from 50 m upward; in general, the bluffs are massive dolostones, commonly containing stromatoporoids, and the precursor rocks were probably crinoidal lime mudstones; recessive intervals of thin to medium bedded dolostones with common fenestral fabric may represent shallowing sequences that culminate in exposure surfaces	54.0	169.5
3	**Limestone:** light to medium grey weathering and resistant unit that forms a prominent basal Ogilvie cliff; lower 3.0 m is thin to medium uneven and wavy bedded with poorly developed argillaceous partings; this is overlain by massive weathering and indistinctly bedded rocks of similar lithology; pervasive brown mottling; very dark grey crinoidal lime mudstone; occasional small (5 cm diameter) bulbous stromatoporoids	10.0	115.5
Total measured thickness of the Dolomite Member is 115.0 m.			
Total measured thickness of the Ogilvie Formation is 301.0 m.			
	Michelle Formation		
2	**Argillaceous limestone:** Medium brown and greyish brown weathering and moderately recessive unit; brown, thin to medium bedded argillaceous lime mudstone and skeletal wackestone with abundant skeletal debris including mainly tiny crinoids and amphiporids; several solitary thick beds of fossiliferous lime mudstone contain abundant, partly silicified globular stromatoporoids that are up to 30 cm in diameter; bed partings smooth and wavy	25.5	105.5

Unit	Description	Unit thickness (m)	Cumulative thickness (m)
1	**Argillaceous limestone:** Medium brown weathering and recessive unit that extends up a largely vegetated slope but good exposures in steep-sided gullies; dark brown argillaceous lime mudstone and skeletal wackestone as in unit 2 but less fossiliferous; unit is capped by a resistant, thick, brownish grey bed formed of tabular to equant breccia clasts of grey lime mudstone in a brownish grey lime mudstone matrix (debris-flow deposit?); this unit is underlain by recessive, dark grey shale of the Road River Formation	80.0	80.0

Total measured thickness of the Michelle Formation is 105.5 m.

Total thickness of Section MTA-84-5 is 406.5 m.

SECTION MTA 84-6 (51)

This section includes strata of the Michelle and Ogilvie formations and is located in the central part of the Hart River map area (116H) about 4 km west of Hart River. This section, like Section MTA-84-2, also extends northward across the lower Paleozoic strata exposed along the hanging wall of the Carter Fault. The base of the section is at 65°40'16"N latitude and 136°51'15"W longitude. The section is best seen on RCAF air photo A:13137-152.

Ogilvie Formation

9	**Limestone:** Medium to dark grey weathering and recessive unit sporadically exposed down a dip slope; scattered rubbly outcrops; medium to dark grey lime mudstone and crinoidal wackestone with occasional limestone breccia (float breccia of lime mudstone clasts in crinoidal wackestone/mudstone matrix); commonly silicified (silicification increases upsection towards the Canol contact), generally darker towards the Canol contact	100.0	521.0
8	**Limestone:** Medium grey weathering and resistant unit that forms cliffs on east side of ridge; thick to very thick bedding with uneven bed partings; dark to medium grey lime mudstone; occasional *Molleritia*; basal 2 m laminated (recrystallized fenestral fabric?)	18.0	421.0
7	**Limestone:** medium to dark grey weathering (dark colour dominates in upper parts of section) and slightly to moderately resistant with rare recessive intervals; medium to thin bedded with platy intervals in lower third of unit and thick bedded in upper part; locally ribbed weathering pattern; unfossiliferous lime mudstone, locally fenestral and platy in lower parts; gradually changes upsection to crinoidal (fossiliferous) lime mudstone; becomes nodular and argillaceous in upper parts of unit; at 85.5 m, fetid black limestone (correlates with base of unit 5-8); biostromal at 90 m, crinoidal with corals and stromatoporoids in growth position; platy amphiporid floatstone bed at 90 m	23.0	403.0

Dolomite Member

6	**Calcareous dolostone:** Light yellow-brown weathering and slightly recessive unit; medium to thin bedded, light yellow-brown to light grey, finely crystalline calcareous dolostone and dolomitic lime mudstone; platy; occasional fenestral fabrics and thin beds (up to 20 cm thick) of flat pebble (storm?) breccias and amphiporid floatstones; similar to unit 5	78.0	280.0
5	**Dolostone:** Mottled light grey weathering and slightly recessive unit; very thick bedded; fine to medium crystalline dolostone, common dolomitized breccia fabrics, scattered stromatoporoids in lower parts of unit, the upper 25 m of the unit weathers a uniform medium grey, thick to very thick bedded, local breccias and thin (10 cm) horizons of flat pebble breccias (storm?, tidal flat?), the upper 5 m has traces of fenestral fabric	75.0	202.0
4	**Limestone and dolomitic limestone:** Light grey weathering and recessive unit; thick bedded and colour mottled, medium grey rubble breccia with darker lime mudstone fragments in a lighter grey dolomitic lime mudstone matrix; clasts are generally subangular	15.0	127.0
3	**Limestone:** Light to medium grey weathering and resistant unit; very thick bedded; medium grey crinoidal lime mudstone, which is brecciated in lower 3.0 m, grades upward into stromatoporoidal crinoidal lime mudstone in upper part of unit; stromatoporoids commonly not in growth position	10.0	112.0

Total measured thickness of the Dolomite Member is 178.0 m.

Total measured thickness of the Ogilvie Formation is 419.0 m.

Michelle Formation

2	**Argillaceous limestone:** Medium greyish brown weathering and recessive unit that is mainly a scree-covered slope with a few resistant bands that form outcrops; brown, thin to medium bedded argillaceous and skeletal wackestone with a very diverse fauna of brachiopod, crinoid, trilobite, coral (favositids, alveolitids and thamnoporids) and gastropod fragments; some large, unfragmented horn corals also occur within these beds; one or two thick, irregular, grey lime mudstone beds that contain silicified and partly reworked stromatoporoids occur near the upper contact of this unit with the overlying Ogilvie strata; these thick beds also contain grey clasts of crinoidal lime mudstone that closely resemble the lime mudstones of the immediately overlying Ogilvie Formation	57.0	102.0

Unit	Description	Unit thickness (m)	Cumulative thickness (m)
1	**Argillaceous limestone:** Medium greyish brown weathering and recessive unit; largely vegetated but upper part of unit contains several small cliff exposures; brown, very thin to medium bedded argillaceous lime mudstone and skeletal wackestone; lower part of unit is more argillaceous and platy; platy, lenticular to planar, discontinuous partings in medium beds; medium beds are broadly wavy, or undulatory; intrabed scour-fillings are common; some graded beds formed of oriented skeletal fragments; this unit overlies the recessive dark shale of the Road River Formation	45.0	45.0

Total measured thickness of the Michelle Formation is 102.0 m.

Total thickness of Section MTA-84-6 is 521.0 m.

SECTION MTA-84-7 (52)

This section includes strata of the Road River, Michelle and Ogilvie formations and was measured across the same structural panel as Section MTA-84-2 at a location approximately equidistant between the Blackstone and Hart rivers near Mount Carter. The base of the section is at 65°40'53"N latitude and 137°00'41"W longitude. The section is well shown on RCAF air photo A:13138-42.

Ogilvie Formation

10	**Limestone:** medium grey weathering and recessive unit that extends down dip slope to the foot of Eagle Plain; medium to thin irregular planar bedded, black lime mudstone; abundant chert nodules and horizons on bedding planes; unfossiliferous	55.0	703.5
9	**Limestone:** Dark grey weathering and recessive unit; thin to medium platy bedded, black fossiliferous lime mudstone; chert horizons common; local debris flows	30.0	648.5
8	8 **Limestone:** Dark grey weathering and recessive unit; medium to thin bedded; black crinoidal lime mudstone to packstone (crinoidal debris flows); rare breccias; occasional silicification of fossils and matrix; two-holed crinoids abundant; top 8 m of unit is platy and argillaceous; 8 m above base of unit, alveolitids, amphiporids and solitary horn corals in debris flows; flows are irregular in thickness (average 10 cm) and generally have well scoured bases	15.0	618.5
7	**Limestone:** Dark grey weathering and alternating resistant and recessive intervals form unit; recessive intervals are generally planar medium bedded and occasionally platy; resistant intervals are thin to very thick irregular bedded; black to dark brown lime mudstone to very fossiliferous wackestones; in general the rocks are more argillaceous upsection and nodular bedding is common; at 20 to 45 m the unit is similar to that at 85.5 m in unit 4-7 and contains *Amphipora* and *Moelleritia*; fossils in the wackestones and mudstones are dominated by crinoids with *Favosites*, *Alveolites*, *Amphipora*, stromatoporoids, and gastropods; there does not appear to be any relationship between lithology and weathering characteristics; geopetal gastropods in upper 10 m of unit	120.0	603.5
6	**Limestone:** Light to medium grey weathering and moderately resistant unit; alternating medium to thick planar bedded, dark brown-grey to pale yellow-brown lime mudstone; the darker lime mudstone is more coarsely crystalline and may be recrystallized	15.0	483.5

Dolomite Member

5	**Dolostone:** Light grey weathering and recessive unit; thin to medium bedded, medium grey finely crystalline dolostone with discontinuous partings; some platy intervals of medium yellow-brown weathering, light yellow-brown finely crystalline dolostone; tectonic fracturing common; above 25 m laminites and fenestral fabrics are common with occasional tidal flat? breccias (storm deposits?); platy yellow-brown intervals become subordinate upsection to grey weathering, medium bedded dolostone; at 117 m and above, amphiporid floatstones are common (equivalent to unit 4-6a?)	144.0	468.5
4	**Dolostone:** Light grey weathering and slightly resistant unit; more resistant than Michelle but less resistant than overlying unit; very thick bedded in lower 15 m with a gradational change from medium to thick bedded upsection (from 15 to 32 m) (very thick bedded from 33 to 56 m); medium grey, finely crystalline, dolomitized, fetid crinoidal mudstone; occasionally nonfossiliferous; tectonic breccias common in lower parts (angular clasts with sparry calcite cement); organic-rich; scattered medium to thick planar bedding with fenestral fabric from 56 m to top of unit, exposure surface at 75 m; scattered resistant knobs on hillside may represent medium bedded lenses of subtidal carbonate within this largely peritidal sequence; Occasional limy pods occur in the middle of the unit; Gradational contact with underlying Michelle	190.0	324.5

Total measured thickness of the Dolomite Member is 334.0 m.

Incomplete thickness of the Ogilvie Formation is 568.5 m.

Unit	Description	Unit thickness (m)	Cumulative thickness (m)
	Michelle Formation		
3	**Argillaceous limestone:** Medium brownish grey weathering and slightly resistant unit; this unit forms the first large outcrops above the recessive shale of the Road River Formation; a 10 m thick massive grey bed at the base of the unit passes upward to brownish grey, thick bedded crinoidal and slightly argillaceous wackestone and fossiliferous lime mudstone; large, angular to tabular clasts, up to 30 cm long, of dark grey lime mudstone and crinoidal lime mudstone occur in a matrix of crinoid packstone in thicker beds of this unit; basal massive bed also contains large clasts of lime mudstone in a crinoidal wackestone matrix; thamnoporid-like corals are also scattered throughout this bed	27.0	134.5
2	**Argillaceous limestone:** Medium brown to yellowish brown weathering and recessive unit; mainly a vegetated slope with only sparse outcrop; thin to medium bedded, argillaceous, brown and yellow skeletal wackestone containing brachiopod, trilobite, solitary and colonial coral and *Receptaculites* fragments; crinoids abundant and some very robust brachiopods; planar bed partings; thicker beds are largely skeletal packstone, are crudely graded and contain fragments of lime mudstone up to 10 cm long; skeletal fragments in all beds tend to be oriented parallel to bedding	37.5	107.5
	Total measured thickness of the Michelle Formation is 64.5 m.		
	Road River Formation		
1	**Shale and limestone:** Dark brownish grey to black weathering and recessive unit; mainly vegetated with little outcrop; black, sooty lime mudstone and shale; fissile, thinly laminated bedding with a planar to lenticular parting; three or four more resistant intervals of thin bedded, argillaceous, dark brown lime mudstone, containing sparse brachiopod and trilobite fragments occur near the top of the unit; lower part of unit is shale-dominated and planar bedded	70.0	70.0
	Incomplete thickness of the Road River Formation is 70.0 m.		
	Total thickness of Section MTA-84-7 is 703.5 m.		

SECTION MTA-84-8 (28)

This section includes strata of the Michelle and Ogilvie formations. It is located in the west-central part of the Hart River map area (116H) about 10 km southeast of Mount Buncz and 1 km east of Hart River. The section extends southward across a ridge formed of the Michelle and Ogilvie formations. The base of the section is at 65°25'N latitude and 137°03'W longitude. The section is well shown on RCAF air photo A:13138-30.

Unit	Description	Unit thickness (m)	Cumulative thickness (m)
	Ogilvie Formation		
8	**Limestone:** Light to medium grey weathering and moderately resistant unit that extends down a vegetated dip slope; abundant, prominent, light grey flatirons on a dip slope at 25° gradient; medium grey crinoidal wackestone with abundant two-holed crinoids; thin to medium wavy to lenticular bedding with slightly argillaceous partings; abundant packed crinoids in some beds; a few thick beds of discontinuous lenticular partings form the tops of some flatirons and contain silicified corals and stromatoporoids; this unit is overlain by rusty-weathering, black, silicified shales of the Canol Formation	121.0	506.5
7	**Limestone:** Light to medium grey weathering and moderately resistant unit that forms ridge-line cliffs; medium to light grey and brownish grey crinoidal grainstone, packstone and wackestone; medium to thick planar, well developed but broadly undulatory bedding	57.0	385.5
6	**Limestone:** Medium to light grey weathering and very resistant unit that is the main cliff former in the Ogilvie Formation; almost all thick to very thick bedded, crinoidal packstone and wackestone with scattered colonial corals in thicker more massive beds; one indistinct cycle of thin to thick beds ends at 36 m above the base of the unit; this unit contains submarine scour and fill structures more than 10 m in amplitude and several tens of metres broad near the top of the unit	100.5	328.5
5	**Limestone:** Medium grey weathering and moderately resistant unit that forms a series of small cliffs below the larger cliffs of the overlying units; dark grey crinoidal lime wackestone; medium to thick planar continuous bedding; two bedding cycles occur in this unit in which medium beds grade upward to thick beds; cliffs occur at thick bedded intervals; planar, continuous bed partings; basal thick beds unfossiliferous, occasional *Favosites* in thicker beds	52.5	228.0
4	**Dolomitic limestone:** Very light grey and light yellowish grey weathering and slightly recessive unit; mainly scree covered with little outcrop; laminated, light brown and brownish grey lime mudstone (pelletal?) with many zones of amphiporid floatstone interbedded with nearly white, thin bedded and platy laminite with fenestral fabric; almost all scree of medium and thin planar beds except for uppermost beds in which some mottled thick beds occur; this entire unit appears to become thinner eastward	75.0	175.5

Unit	Description	Unit thickness (m)	Cumulative thickness (m)
3	**Dolomitic limestone:** Light yellowish grey (creamy grey) weathering and slightly resistant unit; light brown and grey stromatoporoidal lime wackestone; some beds may be a stromatoporoid boundstone; globular stromatoporoids are densely packed throughout; unit extends down a dip slope and ends in slight bench; this unit and the overlying unit could be regarded as equivalents of the Dolomite Member	31.5	100.5
Total measured thickness of the Ogilvie Formation is 437.5 m.			
	Michelle Formation		
2	**Limestone:** Medium to dark grey weathering and slightly recessive unit; very dark grey, sparsely fossiliferous lime mudstone with medium, broadly undulatory bedding; uneven bed partings; tiny crinoid ossicles and other skeletal debris (brachiopods mainly?); intrabed scours are common in some beds and are floored with skeletal debris (probably a lag deposit)	51.0	69.0
1	**Argillaceous limestone:** Dark greyish brown weathering and recessive unit that outcrops at the foot of the slope; little outcrop except in stream gully on the side of the slope; dark brown, argillaceous lime mudstone with subordinate skeletal wackestone; very thin, platy bedding in lower part of unit grades upward to medium, planar to undulatory bedding with recessive argillaceous partings; many beds appear graded, with skeletal debris concentrated in the lower parts of the beds; crinoids, amphiporids and thamnoporids are common in addition to brachiopod fragments; this unit is probably underlain by shale of the Road River Formation	18.0	18.0
Total measured thickness of the Michelle Formation is 69.0 m.			
Total thickness of Section MTA-84-8 is 506.5 m.			
	SECTION MTA-84-9 (29)		
This section includes strata of the Michelle and Ogilvie formations and is located in the centre of the Hart River map area (116H) about 6 km east of Hart River. This section is 3 km eastward along strike with section MTA-84-8 and extends southward across the same ridge formed of the Michelle and Ogilvie formations. The base of the section is at 65°26'N latitude and 136°58'W longitude. The section is well shown on RCAF air photo A:13138-30.			
	Ogilvie Formation		
7	**Limestone:** Medium to dark grey weathering and slightly recessive unit that forms the ridge summit and extends down dip slope toward the contact with the overlying siliceous shales of the Canol Formation; medium to dark grey platy lime mudstone with uniform, thin, well defined bedding; planar bed partings; thin lenses of black chert are strung out parallel to bedding	80.0	311.5
6	**Limestone:** Medium to dark grey weathering and very resistant unit that is the main cliff former of the Ogilvie Formation; dark to medium grey crinoidal wackestone and packstone; medium continuous bedding with irregular and poorly developed partings grades upward to a few very thick and resistant beds at the top of the unit; the poorly developed bedding causes the unit to have an overall massive weathering appearance	39.0	231.5
5	**Limestone:** Dark to medium grey weathering and slightly recessive unit; mainly a vegetated slope; dark grey crinoidal wackestone; medium bedded in lower and middle parts of unit but some thick beds near top of unit; a few widely separated lime mudstone beds contain fenestral fabric in the lower part of the unit; some black chert in upper part of unit	34.5	192.5
	Dolomite Member		
4	**Calcareous dolostone:** Light grey weathering and slightly recessive unit that is mainly a talus, or scree covered slope; grey and brown, medium bedded dolomitic lime mudstone and calcareous dolostone; lighter grey beds are calcareous dolostone and tend to be laminated and contain abundant, well developed fenestral fabric; some mudflake-type synsedimentary breccias in lighter grey to white beds; amphiporids and thamnoporids common in darker grey medium beds	60.0	158.0
Total thickness of the Dolomite Member is 60.0 m.			
Total measured thickness of the Ogilvie Formation is 213.5 m.			
	Michelle Formation		
3	**Dolostone:** Medium to light greyish yellow weathering and resistant unit that forms a series of ragged bluffs; light yellowish brown, finely crystalline dolostone that is rather featureless; thick to very thick, poorly developed bedding; many beds are formed of rubble floatbreccias and packbreccias in which irregular, subangular clasts of yellowish brown dolostone are suspended in a matrix of grey, calcareous dolostone; some breccia clasts are hemispheroidal stromatoporoids	50.0	98.0
2	**Calcareous dolostone:** Dark grey to yellowish grey weathering and slightly recessive unit that forms a vegetated slope with scattered outcrop; dark brownish grey, sparsely crinoidal dolomitized lime wackestone and lime mudstone; medium planar bedding with irregular bed partings; bed thickness increases upward in unit	18.0	48.0

Unit	Description	Unit thickness (m)	Cumulative thickness (m)
1	**Argillaceous and dolomitic limestone:** Medium brownish grey weathering and recessive unit that forms a series of small outcrops; dark greyish brown, partly dolomitized, argillaceous and slightly fossiliferous lime mudstone; abundant receptaculites and amphiporids in some beds; receptaculites fragments have a "rolled up" appearance; thin to medium undulatory bedding with brownish orange, argillaceous partings and common intrabed scour-fillings; some graded skeletal wackestone beds containing amphiporid, brachiopod and crinoid fragments may be turbidite deposits; this unit is underlain by Road River shale	30.0	30.0

Total measured thickness of the Michelle Formation is 98.0 m.

Total thickness of Section MTA-84-9 is 311.5 m.

SECTION MTA-84-10 (34)

This section includes strata of the Michelle and Ogilvie formations and is located near the centre of the Hart River map area (116H). It extends southward across a low ridge formed of the Michelle and Ogilvie formations about 5.0 km east of Hart River. The base of the section is at 65°27'30"N latitude and 136°57'W longitude. The section is well shown on RCAF air photo A:13138-30.

Ogilvie Formation

5	**Limestone:** Dark grey weathering and moderately recessive unit that extends down a dip slope; dark grey, thin bedded lime mudstone; black chert lenses strung out parallel to bedding; some medium beds in lower part of unit form the ridge summit; some hemispheroidal stromatoporoids in these medium beds; upper contact with Canol Formation	45.0	164.0
4	**Limestone:** Medium grey weathering and resistant unit that is the main Ogilvie cliff-former in this section; dark to medium grey, thick to very thick bedded coral-bearing crinoid wackestone; abundant two-holed crinoids; irregular bed partings	24.0	119.0
3	**Limestone:** Medium grey weathering and slightly recessive unit that leads upward to main cliff; mainly a talus slope with little outcrop; mainly medium grey, medium bedded crinoid wackestone; some thinner, laminated lime mudstone intervals	45.0	95.0

Dolomite Member

2	**Calcareous dolostone:** Light greyish yellow weathering and slightly recessive unit that is completely scree-covered; interbedded light grey fenestral dololaminite and calcareous, amphiporid-bearing lime mudstones	45.0	50.0

Total measured thickness of the Dolomite Member is 45.0 m.

Total measured thickness of the Ogilvie Formation is 159.0 m.

Michelle Formation

1	**Dolomitic limestone:** Medium yellowish to brownish grey weathering and slightly resistant unit; this unit is at the base of good exposure and is really only a couple of thick, brown beds marking the apparent top of the Michelle Formation; beds of rubble floatbreccia and packbreccia in which subangular, but plastically deformed, grey clasts of crinoidal lime mudstone are suspended in a matrix of yellowish brown skeletal wackestone; finely comminuted brachiopods and crinoids in the breccia matrix; these beds have an almost nodular appearance	5.0	5.0

Incomplete thickness of the Michelle Formation is 5.0 m.

Total thickness of Section MTA-84-10 is 164.0 m.

SECTION MTA-84-11 (3)

This section includes strata of map unit 10 and map unit 14 of Green (1972). These strata are equivalent to the Ogilvie and Canol, or Nation River formations farther north. The section is located in the central part of the Nash Creek map area (106D) about 5.0 km west of Hart Lake. It extends northeastward down the nose of a mountain ridge at the headwaters of Hart River. The base of the section is at 64°35'N latitude and 135°17'30"W longitude.

Map unit 14 (Canol Formation)

6	6 **Siliceous shale:** Rusty brown weathering and recessive unit that strongly resembles the silicified shale of the Canol Formation in the Hart River map area (116H) immediately north of the Nash Creek map area (106D)	1.5	712.0

Incomplete thickness of map unit 14 is 1.5 m.

Map unit 10 (largely Ogilvie Formation equivalent - Dolomite Member)

5	**Dolostone:** Light grey weathering and moderately resistant unit but with very little true outcrop; blocky talus-covered slope, probably originally thick bedded; light grey, finely to medium crystalline dolostone with a few scattered, poorly preserved corals; some beds of sedimentary floatbreccia in which subangular, medium grey clasts are suspended in a lighter grey matrix; clasts up to 15 cm long	90.0	710.5

Unit	Description	Unit thickness (m)	Cumulative thickness (m)
4	**Dolostone:** Light grey weathering and moderately resistant unit that forms a large, knobby prominence at the end of the ridge; intervals of medium to dark grey, finely to medium crystalline dolostone alternate with light grey, thin bedded to laminated, aphanocrystalline dolostone in repetetive bedding cycles several metres thick; amphiporids occur in some of the darker beds and some darker beds are mottled; fenestral fabric is common in dololaminite intervals	165.0	620.5
3	**Dolostone:** Light greyish yellow weathering and slightly recessive unit that extends over a high point along the ridge and down across a vegetated saddle; repetetive bedding cycles in which intervals of thick to thin, planar bedded, finely to medium crystalline dolostone alternate with intervals of yellow dololaminite and thin bedded, aphanocrystalline dolostone; yellow intervals dominate in lower part of unit	282.0	455.5
2	**Dolostone:** Medium brownish grey weathering and moderately resistant unit with subdued cliffs; greyish brown, medium to thick bedded, finely crystalline dolostone that contains silicified corals; basal 20 m of unit is yellow weathering, light brown, thick bedded dolostone containing abundant silicified tabular and hemispheroidal stromatoporoids; in rest of unit, intervals of thick bedded, amphiporid-bearing dolostone alternate with medium bedded intervals of grey to brownish grey mottled dolostone	106.5	174.0
1	**Limestone:** Dark grey weathering and moderately resistant unit that forms a series of ridge spurs; dark grey lime mudstone and skeletal wackestone with poorly developed, thin and irregular bedding (almost nodularly bedded in places); some light grey mottling; grey lime mudstones tend to grade upward to thinner bedded and lighter grey beds; silicified coral and brachiopods occur in the darker grey beds	67.5	67.5

Incomplete thickness of Map Unit 10 (Ogilvie Formation?) is 710.5 m.

Total thickness of Section MTA-84-11 is 712.0 m.

SECTION MTA-84-12 (6)

This section includes strata of map unit 8, map unit 12, map unit 13 and map unit 14 of Green (1972). These strata are approximately equivalent to the ЄDb map unit, the Ogilvie and Canol, or Nation River formations farther north. The section is located in the northwest part of the Nash Creek map area (106D) at the headwaters of Royal Creek. It extends southwestward up the nose of a mountain ridge. The base of the section is at 64°47'30"N latitude and 135°22'11"W longitude.

Map Unit 13 (Canol Formation)

10	**Limestone and shale:** Dark grey weathering and moderately resistant unit that extends along a bench on the ridge line; dark grey, platy lime mudstone and black shale; upper 20 m of unit is dominantly black shale; strata 25 to 50 m above the base of the unit are chert-bearing and rust-coloured; this unit underlies brown and orange weathering siltstones of map unit 14 (Green (1972)	75.0	1140.0

Total measured thickness of Map Unit 13 (Canol Formation) is 75.0 m.

Map Unit 12 (Ogilvie Formation)

9	**Limestone:** Medium to dark grey weathering and resistant cliff-forming unit; medium to dark grey, thin to thick bedded lime mudstone and skeletal wackestone; small crinoid ossicles are abundant (some two-holed ossicles); wavy, smooth bed partings; dark grey chert nodules scattered parallel to bedding; a few orthoconic cephalopods; this unit is probably equivalent to the Ogilvie Formation farther north	45.0	1065.0

Total measured thickness of the Ogilvie Formation within map unit 12 is 45.0 m.

Map Unit 12 (Road River Formation)

8	**Shale and limestone:** Medium grey weathering and slightly recessive unit that extends upslope toward overlying resistant cliffs; platy and argillaceous, dark grey, very thin bedded lime mudstone and shale; smooth bedded lime mudstone dominates near top of unit except for uppermost shaly beds; some thin skeletal wackestone beds contain abundant tentaculitids	267.0	1020.0
7	**Limestone and shale:** Dark grey weathering to brownish orange weathering in upper part of unit; recessive, dark grey to black , pyritic, argillaceous, very thin bedded and platy lime mudstone and graptolitic, calcareous shale; upper, orange weathering part of unit is also platy, argillaceous lime mudstone but with irregular ochre-coloured bed partings; non-graptolitic but with some brachiopods and a few graded, thin to medium beds of crinoidal and lithoclast (mud chips?) packstone; siliceous shale chips occur in some beds	99.0	753.0
6	**Shale:** Dark grey weathering and recessive unit that extends upslope; platy and fissile dark grey shale; graptolites abundant at several horizons	150.0	654.0
5	**Argillaceous limestone:** Dark grey weathering and very recessive unit that extends across a flat, vegetated saddle; dark grey, very thin to thin bedded argillaceous lime mudstone with a few medium beds; smooth, planar and argillaceous, shaly partings; this unit and the overlying units 6, 7 and 8 represent a tongue of the Road River Formation that is 516.0 m thick	51.0	504.0

Total measured thickness of the Road River Formation within map unit 12 is 567.0 m.

Unit	Description	Unit thickness (m)	Cumulative thickness (m)
	Map unit 8 (Bouvette Formation?)		
4	**Dolostone and dolomitic limestone:** Light grey weathering and very resistant cliff-forming unit; light grey, thick bedded finely to medium crystalline dolostone with scattered crinoids; partly dolomitized tan pelletal wackestone beds in middle part of unit have a peculiar, fine brickwork, orange-stained dolomitization pattern; upper part of unit chert-bearing and biostromal, thick bedded dolostone with halysitids and other colonial corals	135.0	453.0
3	**Dolostone:** Medium greyish brown weathering and moderately resistant unit; medium to dark greyish brown, thin to medium bedded, cherty, faintly laminated dolostone; abundant potato-shaped black chert nodules strung out parallel to bedding in lower 50 m of unit; upper part of unit is a talus slope of blocky, greyish brown, featureless dolostone; this unit resembles parts of the Whittaker Formation of the Mackenzie Mountains	150.0	318.0
2	2 **Dolostone:** Medium to light grey weathering and resistant unit; lower part is medium brownish grey, thin to medium bedded, finely crystalline dolostone with lenses or pockets of granule packbreccia with subequant and subrounded dolostone fragments cemented by white dolomite; upper part of unit is light grey and blocky (probably medium to thick bedded)	123.0	168.0
1	**Dolostone:** Medium brownish grey weathering and resistant unit that ends in a slight cliff; medium to dark brownish grey, thin to medium bedded, finely crystalline dolostone (probably dolomitized lime mudstone); planar to slightly wavy bed partings; many beds contain abundant black chert nodules elongate parallel to bedding; scattered solitary (*Bighornia*?) and colonial corals; this unit is close to the base of Map Unit 8 of Green (1972); units 1, 2, 3 and 4 are probably equivalent to the ЄDb map unit for an incomplete ЄDb map unit thickness of 408.0 m	45.0	45.0

Incomplete thickness of The Bouvette Formation (map unit 8) is 453.0 m.

Total thickness of Section MTA-84-12 is 1140.0 m.

SECTION MTA-85-1 (2)

This section includes strata of map unit 10, map unit 11 and map unit 14 of Green (1972). These strata are approximately equivalent to the Bouvette (ЄDb map unit) and Ogilvie formations farther north. The section is located near the centre of the Nash Creek map area (106D) at the headwaters of Nash Creek. It extends southward up the nose of a mountain ridge. The base of the section is at 64°31'30"N latitude and 134°57'W longitude. The section may be seen on RCAF air photo A:20622-9.

	Map Unit 14 (Canol Formation)		
9	**Shale:** Silver- and rust-coloured weathering and recessive unit; dark grey to silver-coloured, platy, noncalcareous shale with rust-coloured partings; this unit resembles the Canol Formation farther north	2.5	835.0

Incomplete thickness of Map Unit 14 is 2.5 m.

	Map Unit 11 (Ogilvie Formation)		
8	**Limestone and dolostone:** Light to medium grey to cream-coloured weathering and moderately resistant unit that is less resistant than the underlying unit 7; light to medium grey, thin to medium bedded lime mudstone; repetetive peritidal cycles of medium lime mudstone interbedded with light grey to cream-coloured dololaminite and laminated lime mudstone containing fenestral fabric with railroad-track-like continuous bedding; some reddish oxidized bed surfaces occur at the top of some dololaminites; top of unit is marked by a darker, thick and nodularly bedded sequence of skeletal and pelletal wackestone and packstone containing crinoids and brachiopods	105.0	832.5
7	**Limestone:** Light grey weathering and very resistant unit that is the major cliff-forming unit of this section; light grey and massive bedded skeletal wackestone, packstone and grainstone; abraded crinoid and brachiopod fragments abundant; "bahamite"-like lithoclasts are abundant; a few distinct thick beds occur at the top of the unit; this unit may be a massive crinoid shoal or bank deposit	78.0	727.5
6	**Limestone:** Medium grey weathering and resistant unit; medium grey, very thick to massive bedded, organic-rich crinoid wackestone and packstone; most crinoid ossicles contain two holes (*Gasterocoma bicaula*?); bedding discontinuous and broadly wavy with a wavelength of 3 to 4 m; upper part of unit is more massive bedded and grades into the overlying unit	46.5	649.5
5	**Limestone:** Dark grey weathering and moderately resistant unit under the main cliff; medium to dark grey, medium bedded crinoid wackestone (almost a crinoid packstone in places); abundant, large, two-holed crinoids; slightly argillaceous; this and the overlying units of map unit 11 are equivalent to the Ogilvie Fornation farther north	54.0	603.0

Total measured thickness of Map Unit 11 is 283.5 m.

Unit	Description	Unit thickness (m)	Cumulative thickness (m)
	Map Unit 10 (Ogilvie Formation - Dolomite Member)		
4	**Dolostone and limestone:** Light grey weathering and slightly resistant unit; medium to light grey, thick to very thick bedded amphiporid wackestone and packstone; typically amphiporids are oriented parallel to bedding; individual thick beds tend to grade upward from medium grey to light grey, or cream-coloured; the tops of beds are partly dolomitized; bedding is gently anastomosing over 5 to 10 m; upper part of unit is unfossiliferous and is formed of featureless, dark grey lime mudstone beds interbedded with light grey dolostone	84.0	549.0
3	**Dolostone:** Light and dark grey weathering (colour banded) and moderately resistant unit; dark brownish grey mottled dolostone is interbedded with yellowish grey dololaminite in medium to thick, planar bedded bedding cycles; some darker beds contain amphiporids and small crinoids; orange-stained bed partings in dololaminites	300.0	465.0
2	**Dolostone:** Light grey weathering and slightly resistant unit that extends along the ridge crest; light grey to cream-coloured, medium bedded, finely crystalline to aphanocrystalline dolostone is dominant with occasional interbeds of amphiporid-bearing medium grey dolostone; light grey mudchips reworked from light grey dololaminite beds occur along the bases of some dark grey beds	99.0	165.0
1	**Dolostone:** Medium to dark grey weathering and moderately resistant unit that extends upslope to a bench along the ridge line; dark grey, thick to very thick bedded and featureless, finely crystalline dolostone is dominant with interbeds of light and dark grey, finely colour laminated and thick dolostone beds; some synsedimentary mudchip breccias within laminated beds; lenses of finely comminuted skeletal material occur in some beds; some teepee structures (probable tidal flat origin); a little fenestral fabric; probably units 1 to 8 inclusive are equivalent to the Ogilvie Formation for an Ogilvie thickness of greater than 832.5 m	66.0	66.0

Incomplete thickness of the Dolomite Member (map unit 10) is 549.0 m.

Incomplete thickness of the Ogilvie Formation is 832.5 m.

Total thickness of Section MTA-85-1 is 835.0 m.

SECTION MTA-85-2 (17)

This section includes strata of the Bouvette (ЄDb map unit) and the Road River formations. It extends northward along a small creek in the southeast part of the Hart River Map area (116H) about 8 km north of Pat Lake. The base of the section is at 65°11'30"N latitude and 136°40'W longitude. The section is well shown on RCAF air photo A:13137-160.

	Road River Formation		
10	**Shale:** Dark grey to black, recessive and soft weathering, fissile and noncalcareous; this shale extends across the valley floor leading up to a cliff line of Ogilvie Formation limestone	100.0	741.5
9	**Limestone:** Light to medium bluish grey weathering and resistant cliff-forming unit; light grey skeletal wackestone and lime mudstone; some silicified colonial corals including large, favositid-type corals; this unit forms the cap rock of a low ridge that trends northward to a shallow, shale-floored valley leading up toward a prominent, east–west-trending cliff formed of Ogilvie Formation limestone	10.0	641.5
8	**Limestone and shale:** Dark grey weathering talus slope of limestone and shale talus; no outcrop in this unit	45.0	631.5
7	**Shale:** Dark grey to black weathering and recessive unit that is slightly resistant at the base; lower part of unit is interbedded intervals of platy dolomitic siltstone and soft, noncalcareous black shale with rust-coloured partings; this grades upward to a continuous sequence of black shale; graptolites abundant at many horizons throughout; this unit is the top of the part of the section exposed in the creek	169.5	586.5
6	**Calcareous siltstone:** Medium brownish-grey weathering and moderately recessive unit that, like unit 4, forms a wider part of the creek; buff, thin, platy to lenticularly bedded, calcareous siltstone; poorly preserved graptolites occur along some bed surfaces	72.0	417.0
5	**Dolomitic and calcareous siltstone:** Medium to light brownish grey weathering and resistant cliff-forming unit that forms a series of waterfalls in a narrow reach of the creek; buff, thin, planar to lenticularly bedded calcareous and dolomitic siltstone with rust-coloured partings forms most of the unit; interbeds of black chert are common (probably from silicification of siltstone beds); top 3.5 m of unit is capped by an orange marker interval of medium bedded, dolomitic siltstone in which the upper parts of beds are extensively burrowed and intrabed scour fills are common; a few poorly preserved graptolites	48.0	345.0
4	**Silty limestone and calcareous siltstone:** Medium brownish grey weathering and recessive unit that forms a wider part of the creek valley; buff, thin bedded, calcareous siltstone with planar to lenticular partings forms most of unit, with occasional, solitary, medium and thick beds of medium brownish grey, silty lime mudstone; some poorly preserved graptolites occur along bed surfaces	64.5	297.0
3	**Calcareous siltstone:** Light yellowish brown and recessive unit; yellowish brown, thin bedded calcareous siltstone passes upward to a dominantly buff siltstone sequence with rust-coloured partings punctuated by solitary medium beds of black chert	45.0	232.5

Unit	Description	Unit thickness (m)	Cumulative thickness (m)
2	**Argillaceous limestone and shale:** Medium to dark brownish grey weathering and very recessive unit with very little outcrop; brownish, thin to very thin bedded, argillaceous lime mudstone; some argillaceous skeletal wackestone beds with finely comminuted skeletal fragments; a few thicker thin beds of pyritic, dark grey lime mudstone beds are scattered throughout	150.0	187.5

Total thickness of the Road River formation is 704.0 m.

Bouvette Formation (ЄDb map unit)

1	**Dolostone:** Light grey weathering and resistant unit; medium grey, medium bedded finely to medium crystalline dolostone; vague mottled pattern; some vague intrabed breccia that may have been synsedimentary	37.5	37.5

Incomplete thickness of the Bouvette Formation is 37.5 m.

Total thickness of Section MTA-85-2 is 741.5 m.

SECTION MTA-86-1 (38)

This section includes strata of the Michelle and Ogilvie formations. It is located in the west-central part of the Hart River map area (NTS 116H) about 15 km west of Blackstone River. The section extends northward down the nose of a ridge. The base of the section is at latitude 65°29'N and longitude 137°57'30"W and may be seen on RCAF air photo A:13230-7.

Ogilvie Formation

10	**Limestone:** Medium to dark grey weathering; thick bedded intervals of biostromal stromatoporoidal and coralline lime wackestone (some *Alveolites*), silicified black and rusty weathering fossils; thick bedded intervals separated by intervals of dark grey, thin bedded, recessive, cherty lime mudstones; thick bedded intervals stand out as a succession of resistant, flatiron cliffs, unit becomes more recessive upward; top of unit may be contact with more recessive, rusty weathering shales of the Canol Formation	255.0	1068.0
9	**Limestone:** Medium grey weathering; mainly smooth weathering, thin to medium bedded, platy lithographic, tan and unfossiliferous, lime mudstone; a few dark brownish- and yellowish-grey argillaceous lime mudstones are scattered throughout; a few thicker fossiliferous beds occur near the top of the interval with two-holed crinoid ossicles and coenites-like corals; no cliff formers in this unit	174.0	813.0

Dolomite Member

8	**Dolostone and limestone:** Medium to light bluish grey weathering and moderately resistant unit that extends along ridge line, a 2 m thick interval of dark, thin to medium bedded crinoidal limestone marks the base of the unit; platy, very thin to thin bedded calcareous dololaminites in the lower part of the unit grade upward to platy lime mudstones; unit is unfossiliferous except for basal marker bed	81.0	639.0
7	**Dolostone and limestone:** Light to medium grey weathering and moderately resistant unit that extends across a prominent high point along the ridge, lower part of unit is platy, very thin to thin bedded light grey dololaminite and dolomitic lime mudstone; synsedimentary mudchip-type rip-up clasts along some bed contacts; thin to medium bedded dolomitic lime mudstone beds and darker, organic-rich and fossiliferous lime mudstone beds in upper part of unit; crinoids and brachiopods common in upper beds	129.0	558.0
6	**Dolostone:** Yellowish to greyish brown weathering and recessive unit that extends across a saddle on the ridge line; lower part is thin to medium bedded yellowish to orangish grey silty dolostone; pockets of orange argillaceous material occur along bed partings with some synsedimentary reworked fragments (i.e. mud chips); laminar fenestral fabric is abundant in lower part; yellowish brown weathering, thin bedded, dark brownish grey, argillaceous, finely crystalline dolostone forms upper part of unit	63.0	429.0
5	**Dolostone:** Light grey to cream weathering and slightly resistant unit; lower half of unit is thin to medium bedded cream coloured aphanocrystalline dolomite with smooth bed partings and abundant laminar fenestral fabric; upper part is medium bedded and is also cream coloured but with a pronounced yellow tint; slightly argillaceous; a few solitary, thick beds containing abundant amphiporid-like fossils occur near the top of the unit; unit extends with a smooth profile downslope to saddle	93.0	366.0
4	**Limestone:** Dark to medium grey weathering, very resistant unit; recessive, thin to medium bedded intervals of dark grey, organic rich crinoidal lime wackestone grade upward to tan, thick bedded, massive weathering cliffs of biostromal lime wackestone containing hemispheroidal stromatoporoids and abundant *Amphipora*, large rugose horn corals, gastropods and brachiopods, recessive parts of cycles rest with sharp contacts on thick bedded intervals and grade upward to thick bedded intervals, three bedding cycles occupy unit and are 15.0, 34.5 and 79.5 m thick, respectively, (possibly upward-shoaling cycles); unit extends up to summit cliff	129.0	273.0

Total measured thickness of the Dolomite Member is 495.0 m.

Total measured thickness of the Ogilvie Formation is 924.0 m.

Unit	Description	Unit thickness (m)	Cumulative thickness (m)
	Michelle Formation		
3	**Limestone:** Medium brownish grey weathering resistant unit; very thin bedded, platy, unfossiliferous, argillaceous, brown lime mudstone intervals alternate with thick, massive, coarsely brecciated, grey, unbedded intervals of crinoidal wackestone lime mudstone; this unit marks the start of prominent outcrop at the beginning of the ridge line	60.0	144.0
2	**Limestone:** Medium brownish grey weathering, very recessive unit; almost all talus from overlying Ogilvie but almost all platy, very thin bedded to laminated argillaceous and occasionally fossiliferous, brown lime mudstone; small brachiopods and crinoids abundant in fossiliferous intervals; a few, thick, grey, coral-bearing lime mudstone beds punctuate upper part of sequence	54.0	84.0
1	**Limestone:** Brown weathering and very recessive unit; this unit is covered by vegetation but rodents have excavated platy, brown, argillaceous lime mudstone containing abundant tentaculitids or styliolinids along bed partings	30.0	30.0

Total measured thickness of the Michelle Formation is 144.0 m.

Total measured thickness of Section MTA-86-1 is 1068.0 m.

SECTION MTA-86-2 (42)

This section includes strata of the Bouvette Formation (ЄDb map unit), and the Road River, Michelle and Ogilvie formations. It is located in the central part of the Hart River map area (NTS 116H) about 10 km west of Blackstone River. The section extends northward down the nose of a ridge. The base of the section is at latitude 65°31'N and longitude 137°41'30"W and may be seen on RCAF air photo A:13230-80.

	Ogilvie Formation		
19	**Limestone:** Largely a covered interval at base of slope but limestone fragments scattered on vegetation, dark grey lime mudstone	135.0	1957.0
18	**Limestone:** Medium grey weathering and resistant cliff-forming unit; thick to very thick bedded, dark grey nodular lime mudstone; some slightly recessive fossiliferous intervals; unit extends downslope	51.0	1822.0
17	**Limestone:** Medium brownish grey weathering and resistant unit; large cliffs of thick bedded, brownish grey, biostromal fossiliferous lime wackestone containing silicified colonial corals and hemispheroidal stromatoporoids alternate with more recessive intervals of thin to medium bedded lime mudstone containing silicified bryozoans; resistant prominent cliffs occur between 20 to 33 m and between 60 and 87 m in this unit; this and underlying units 15 and 16 extend down ridge line	87.0	1770.0
16	**Limestone:** Medium grey weathering and moderately resistant unit with a ribbed appearance; dark grey, very thick to medium bedded, sparsely fossiliferous lime mudstone containing scattered corals and hemispheroidal stromatoporoids	36.0	1684.0
15	**Limestone:** Light brownish grey weathering and moderately resistant unit with a slightly ribbed appearance from a succession of small cliffs; intervals of light brown weathering, thin to medium bedded, slightly resistant and cliff forming, tan pelletal packstone and wackestone alternate with more recessive intervals of dark grey, medium to thick bedded lime mudstone, intervals are about 3 to 7 m thick	105.0	1648.0
	Dolomite Member		
14	**Dolostone:** Medium grey weathering and slightly recessive unit; intervals of light grey, thin bedded, platy, fenestral calcareous dolostone up to 1 m thick alternate with 2 m thick intervals of dark to medium grey, medium bedded, mottled, unfossiliferous, finely crystalline dolostone	96.0	1543.0
13	**Dolomitic limestone:** Medium grey weathering and resistant unit; dark grey, thick bedded fossiliferous wackestone; pervasive light grey mottling due to incipient dolomitization, crinoids and colonial corals abundant with some brachiopods and solitary corals; several prominent flatiron-like cliffs; this unit extends across the high point of the ridge	51.0	1447.0
12	**Dolomitic limestone:** Brownish grey weathering; a neither resistant nor recessive unit; medium bedded brownish grey amphiporid wackestone is dominant but intervals of lime mudstone, rarely laminated and dolomitic, are common; a 20 m thick interval of dominantly light grey, laminated, dolomitic lime mudstone occurs at 60 m above base of unit; uppermost beds from 80 m to top of unit are mottled, brownish grey, fossiliferous lime mudstone containing sparse brachiopods and crinoids; light grey mottlings are dolomitized patches; unit extends upslope	93.0	1396.0
11	**Dolostone:** Brownish grey to grey weathering; a recessive, scree slope unit; intervals of light grey dololaminite with abundant laminar fenestral fabric alternate with intervals of medium grey, amphiporid-bearing, finely crystalline dolostone, unit is platy in lower part but tends to be blocky in upper part, some brownish weathering intervals are slightly argillaceous	81.0	1303.0

Unit	Description	Unit thickness (m)	Cumulative thickness (m)
10	**Dolostone:** Light to medium grey weathering; a recessive, scree covered unit; Scree consists of fragments of thin to medium bedded crinoidal dolostone, unfossiliferous, finely crystalline dolostone, and laminated dolostone containing fenestral fabric and mudchips; a little dolomitized lime mudstone breccia (crackle breccia)	48.0	1222.0
Total measured thickness of the Dolomite Member is 369.0 m.			
The total measured thickness of the Ogilvie Formation is 773.0 m.			
	Michelle Formation		
9	**Limestone:** Medium to dark brown weathering and recessive unit; lower part largely covered by vegetation with patches of brown, argillaceous, platy (i.e. very thin bedded) fossiliferous lime mudstone containing brachiopod and crinoid fragments; upper part of unit is medium greyish brown, medium to thick bedded fossiliferous and argillaceous lime mudstone and wackestone; some breccia beds in which lime mudstone clasts float in an encrinite matrix, breccia beds are dominant in uppermost 15 m of unit; this unit is transitional to the overlying clean carbonates of the Ogilvie Formation	93.0	1174.0
Total measured thickness of the Michelle Formation is 93.0 m.			
	Road River Formation		
8	**Shale and dolostone:** Dark greyish brown weathering and recessive unit; most of this unit is covered by vegetation in the valley floor between the massive carbonates of the ЄDb map unit and the Ogilvie Formation; lower part of unit is dominated by silicified, dark brownish grey, very thin to thin bedded, faintly laminated dolostone; upper part of unit is dark brownish grey and brown shale; the uppermost part of this unit may be part of the Michelle Formation	100.0	1081.0
Total measured thickness of the Road River formation is 100.0 m.			
	Bouvette Formation (ЄDb Map Unit)		
7	**Limestone:** Light to medium grey weathering and resistant unit consisting of two cliff-forming bioherms or biostromes separated by a more recessive interval of platy limestone; lower cliff is 15 m thick with thick, poorly developed bedding, and contains abundant large heads of *Favosites* in a crinoid pellet wackestone matrix; some interbeds of very light grey weathering, tan pelletal lime mudstone; the middle recessive unit is 60 m thick and is formed of thin bedded, argillaceous lime mudstone with scattered horizons containing black chert nodules; uppermost 24 m is a light to medium grey weathering biostromal interval of skeletal lime wackestone and stromatoporoidal biolithite containing abundant silicified hemispheroidal stromatoporoids, halysitid-like and syringoporid-like colonial corals and crinoids	99.0	981.0
6	**Limestone:** Medium bluish grey weathering and slightly resistant unit; medium to dark grey, thin bedded lime mudstone, platy; unfossiliferous; unit extends along ridge line	129.0	882.0
5	**Limestone and shale:** Dark brownish grey and recessive unit; similar to unit 6 but contains brownish grey shale also; mainly vegetated with very little outcrop; unit occupies a small saddle along the ridge line; this unit probably represents a minor tongue of the Road River Formation within the ЄDb map unit	12.0	753.0
4	**Limestone:** Medium bluish grey weathering and moderately resistant unit; mainly medium grey, thin to medium bedded lime mudstone with a few thicker lighter grey fossiliferous beds containing solitary, silicified rugose corals; lime mudstones have smooth, planar bed partings; top of unit is marked by an interval of rubble collapse breccia with clasts of lime mudstone and black chert in a granular limestone matrix cemented by white dolomite; unit extends up from saddle and along part of ridge line	78.0	741.0
3	**Shale and limestone:** Dark brown weathering and very recessive unit; dark brown argillaceous lime mudstone and shale; largely vegetated but abundant platy scree; sporadic thin lime mudstone beds; some graptolites; this unit extends across a saddle in the ridge line and is a major tongue of the Road River Formation that has been mapped within the ЄDb map unit	54.0	663.0
2	**Dolostone:** Light to medium grey weathering and slightly recessive unit; similar to unit 1 but bedding is medium to thick; as in unit 1, numerous bedding cycles, in which dark beds grade upward to lighter grey beds form the unit; crackle breccias common in dark beds as small pods about 1 m across and 0.5 m thick; some black chert in dark beds	216.0	609.0
1	**Dolostone:** Very light grey to light grey weathering and resistant unit; bedding cycles of dark grey dolostone grade upward to light grey beds whose uppermost contact is vuggy and karstic in appearance; cycles about 1.5 to 3.5 m thick; pods of white dolomite-cemented crackle breccia occur beneath the upper contacts of light grey intervals; macropore type vugs are scattered throughout many darker beds	393.0	393.0
Incomplete thickness of the Bouvette Formation is 981.0 m.			
Total thickness of Section MTA-86-2 is 1957.0 m.			

Unit	Description	Unit thickness (m)	Cumulative thickness (m)
	SECTION MTA-86-3 (35)		
	This section includes strata of the Slats Creek and Taiga formations and part of the Bouvette Formation (ЄDb map unit). It is located on the west-central part of the Hart River map area (NTS 116H) about a kilometre east of Blackstone River. The section extends southeastward across a ridge. The base of the section is at latitude 65°27'30"N and longitude 137°16'W. It may be seen on RCAF air photo A:13489-109.		
	Bouvette Formation (ЄDb map unit)		
9	**Dolostone:** very light grey, almost white weathering and resistant unit but no large cliffs; light grey, finely crystalline dolostone with poorly developed thick bedding; vugs tend to be concentrated near the upper surfaces of beds similar to those in unit 7; some darker grey beds contain small pods of white dolomite-cemented collapse breccia; unit extends down dip slope to valley floor	105.0	1481.0
8	**Dolostone:** Medium to dark grey weathering and very resistant unit that forms a prominent summit cliff along the ridge line; most of unit is a spectacular microstromatolitic bioherm formed of thick bedded, laterally linked digitate stromatolites in dark grey, sucrosic dolostone with white mottling	75.0	1376.0
7	**Dolostone:** Very light grey weathering and resistant unit but with no large cliffs; mainly light grey and featureless, thick bedded finely crystalline dolostone in lower part; many beds contain karst-like vuggy macropores immediately beneath bed contacts; some darker brownish grey, coarser crystalline mottled dolostone beds that contain abundant black chert and pods of collapse breccia occur near top of unit	474.0	1301.0
6	**Dolostone:** Dark brownish grey weathering and resistant unit; similar to underlying unit but a few very thick beds of vuggy, medium crystalline, or sucrosic, dolostone, mainly thick bedded like underlying unit; some beds contain intervals of closely spaced digitate stromatoporoids; some stromatolitic beds are partly silicified with irregular, black to light grey chert masses; most beds are vaguely mottled with irregular small vugs; unit extends upslope to near summit where the ЄDb map unit becomes abruptly light grey weathering	96.0	827.0
5	**Dolostone:** Dark grey to dark brownish grey weathering and resistant unit; largely featureless, rough weathering, medium brownish grey, finely to medium crystalline, or sucrosic, dolostone with scattered patches of black and white chert, a few beds contain closely spaced digitate stromatolites; unit extends upslope	258.0	731.0
4	**Silty dolostone:** Yellowish grey weathering and moderately resistant unit; intervals of silty, yellow dololaminite containing synsedimentary reworked mudchips separate intervals of thick bedded, medium to light grey microstromatolitic dolostone; at 90 m above base of unit there is a 10 m thick interval of laterally linked, closely spaced domal stromatolites that have an average amplitude of about 1.5 m (i.e. 1.5 m high) and wavelength of 2 to 3 m; these large stromatolites are composed of amalgamated beds of digitate microstromatolites, which, in other places, form planar beds; yellowish silty dololaminite dominates in lower part of unit	150.0	473.0
3	**Dolostone:** Medium to dark grey weathering and very resistant unit; intervals of yellow silty dololaminite, less than 1.0 m thick, separate intervals of thick to very thick bedded featureless, slightly vuggy, dark grey dolostone; intraclast grainstones, possibly of beachrock origin, occur in some beds in the lower part of the unit; some thick beds contain intervals of slightly digitate microstromatolites that are polygonal in plan view and may have grown on mudcracks; some beds contain small, hemispheroidal stromatolites composed of microstromatolites; irregular black chert masses have replaced stromatolites near the top of the unit	177.0	323.0
	Incomplete thickness of the Bouvette Formation is 1345.0 m.		
	Taiga Formation		
2	**Silty and sandy dolostone:** Yellowish grey weathering and moderately resistant unit; silty yellow, thin to medium bedded dololaminite; featureless, platy, silty dolomudstone dominates upper part of unit; lower part of unit is varicoloured yellow, orange and even red with multiple, minor erosion surfaces characterized by pockets of reworked mudchips and pebbles of dolomudstone in an orangish to reddish, silty to sandy matrix and by abundant mudcracks; some mudflake and mudchip breccias occur in the few, thin quartzarenite sandstone beds in the lower part of the unit; laterally linked hemispheroidal stromatolites are common in the lower part and some beds contain spectacular digitate microstomatolites that have a polygonal pattern in plan view outlined by reddish argillaceous material; mudcracks are common throughout; unit extends upslope to a recessive grassy bench	96.0	146.0
	Total measured thickness of the Taiga Formation is 96.0 m.		
	Slats Creek Formation		
1	**Quartzite:** Reddish brown to orange weathering and resistant unit; metamorphosed medium to thick bedded, dark reddish brown quartzarenite sandstone; wispy, thin, micaceous partings common; some shallow trough-crossbedding and minor vertical burrow fillings visible on undersides of beds; red colour due to oxidized iron minerals; almost no outcrop but instead felsenmeer-type scree slope; the total thickness of the Slats Creek Formation was estimated by sight to be about 500 m thick at this locality	50.0	50.0
	Incomplete thickness of the Slats Creek Formation is 50.0 m.		

Unit	Description	Unit thickness (m)	Cumulative thickness (m)
	Total measured thickness of Section MTA-86-3 is 1481.0 m (a total estimated measured section thickness of 1931.0 m if a 500.0 m total thickness is assigned to the Slats Creek Formation)		
	SECTION MTA-86-4 (15)		
	This section includes strata of the Ogilvie and Bouvette formations (ЄDb map unit). It is located in the southwest part of the Hart River map area (NTS 116H) about 4 km east of Blackstone Lake. The section extends northward across and along a ridge. The base of the section is at latitude 65°10'N and longitude 137°43'W and may be seen on RCAF air photo A:13230-89.		
	Ogilvie Formation		
6	**Limestone:** Medium bluish grey weathering and very resistant unit; grey crinoid wackestone with abundant large colonial coral colonies (hemispheroidal) and scattered solitary rugose corals; many two-holed crinoids (*Gasterocoma bicaula*?), thick to very thick, poorly developed bedding; this unit is a prominent cliff former	120.0	432.0
	Dolomite Member		
5	**Dolostone and limestone:** Cream-coloured weathering and largely recessive unit; yellowish grey, thin to medium bedded, very finely crystalline dolomudstone with abundant laminar fenestral fabric and some scattered mud-chip breccias along bed contacts; a few silty and argillaceous partings between beds; scattered resistant medium beds of bluish grey weathering, tan lithographic lime mudstone occur near base of unit; amphiporid-rich beds are scattered throughout; this unit extends across and down nose of ridge	78.0	312.0
	Total measured thickness of the Dolomite Member is 78.0 m.		
	Total measured thickness of the Ogilvie Formation is 198.0 m.		
	Bouvette Formation (ЄDb map unit)		
4	**Dolostone and limestone:** Light yellowish grey weathering and slightly recessive unit; lower 45 m is yellow to pale orange weathering, thin to medium bedded, silty and argillaceous dolostone; some fenestral fabric and rip-up mudclasts in lower part; in upper part of unit these dolostones are interbedded with 1 to 2 m thick intervals of medium, planar bedded, lithographic, bluish-grey tan lime mudstone; some occurrences of *Moelleritia canadensis*?; this unit extends southeastward across broad ridge	75.0	234.0
3	**Limestone:** Medium bluish grey weathering and resistant unit; lower 15 m of unit is thin bedded, light grey, platy to flaggy lime mudstone; bedding becomes progressively thicker upsection with thin intervals of platy lime mudstone alternating with thick to massive bedded biostromal, stromatoporoidal lime wackestone with some biolithite; thicker beds contain large hemispheroidal stromatoporoids (i.e. cabbage-like stromatoporoids); stromatoporoid floatstone common in thick beds lower in unit; some favositid-like corals scattered throughout; this unit is the most resistant cliff former along the ridge line	75.0	159.0
2	**Limestone:** Medium bluish grey weathering and resistant unit; grey, stromatoporoidal lime wackestone with abundant marble- to baseball-sized stromatoporoids in nodularly bedded intervals; many intervals of medium, smooth bedded, tan pelletal lime mudstone containing abundant laminar fenestral fabric; this unit forms a distinct bump on ridge line	48.0	84.0
1	**Limestone and dolostone:** Light yellowish grey weathering and recessive unit; bluish grey limestone intervals several metres thick are separated by thinner intervals of platy, silty, yellow and orangish yellow dolomudstone that is faintly laminated; tan pelletal lime mudstone forms the limestone intervals; a few amphiporid-bearing beds scattered throughout the limestone intervals; this unit forms a level stretch along the ridge	36.0	36.0
	Incomplete thickness of the Bouvette Formation is 234.0 m.		
	Incomplete thickness of Section MTA-86-4 is 432.0 m.		
	SECTION MTA-86-5 (4)		
	This section includes strata of the Bouvette Formation (ЄDb map unit) and some unnamed Proterozoic-aged strata. It is located near the centre of the Dawson map area (NTS 116B-116C, E1/2) about 10 km south of Mount Gibben. The section extends northward across an east–west-oriented mountain ridge. The base of the section is at latitude 64°37'30"N and longitude 139°11'W. It may be seen on RCAF air photo A:13139-169.		
	Bouvette Formation (ЄDb map unit – map unit 8 of Green (1972))		
6	**Silty dolostone:** Orangish grey weathering and very resistant; mainly orange, silty, laminated dolostone with some interbeds of dark brownish grey, thick bedded (chocolate coloured) silty dolostone; dark dolostones tend to be burrow mottled and have reddish bed partings; fenestral fabric and mudchip breccias are common in yellow dololaminites	120.0	559.0

Unit	Description	Unit thickness (m)	Cumulative thickness (m)
5	**Dolostone:** Light grey and cream weathering and very resistant unit; lowermost 12 m is a resistant knob of medium bedded, light grey, fenestral, faintly laminated, dolomudstone; above this is rather featureless, faintly laminated dolomudstone with scattered interbeds of featureless, light grey, medium to thick bedded, finely crystalline dolostone; lowermost knob is capped by an orange, regolithic siltstone with small, sediment-filled fissures extending downward from the contact; a 3 m thick zone of orange breccia occurs at 87 m above the base of the unit; this oligomictic breccia is formed of platy, laminated, light grey dolostone clasts in a dolomite-cemented, orange, fine sandstone matrix; top of unit may be an unconformable contact; this unit forms prominent cliffs	189.0	439.0
4	**Dolostone:** Light grey to cream-coloured weathering and resistant unit; very similar to overlying unit; dominantly featureless, light grey, medium to thick bedded, finely crystalline dolostone; many beds of dolomitized pisolitic grainstone and/or pisolitic packstone in lower part of unit; lenses of intraformational dolomudclast breccia occur sporadically throughout	123.0	250.0
Incomplete thickness of the Bouvette Formation is 432.0 m.			
	Unnamed Proterozoic		
3	**Silty dolostone:** Yellowish grey weathering and recessive unit; silty, thin bedded and platy, tan coloured dololaminite with prominent silty laminae; this unit is almost entirely vegetated	52.0	127.0
2	**Conglomerate:** Buff to light-orange weathering and resistant unit; a greyish orange, polymictic, medium to very thick bedded conglomerate with cobbles and pebbles of chert and stromatolitic dolostone as a floatstone in a sandy, dolomite-cemented matrix; this unit forms a prominent bluff	36.0	75.0
1	**Conglomeratic siltstone:** Red weathering and moderately resistant unit; red dolomitic siltstone and mudstone with some lenses of granule conglomerate containing fragments of chert, quartz and dolostone; mudcracks and mudchips in mudstone intervals; some pale green beds	39.9	39.0
Incomplete thickness of the Unnamed Proterozoic is 127.0 m.			
Total thickness of Section MTA-86-5 is 559.0 m.			

SECTION MTA-86-6 (39)

This section includes strata of the Road River, Michelle and Ogilvie formations. It is located on the east side of the Ogilvie River map area (NTS 116G and F, E1/2) about 3 km southwest of Mount Jeckell near the Dempster Highway. The section extends northward across a ridge. The base of the section is at latitude 65°22'N and longitude 138°27'30"W. It may be seen on RCAF air photo A:13230-7.

	Ogilvie Formation		
13	**Limestone:** Light grey weathering and resistant unit; medium to dark grey, medium to thick bedded, fossiliferous lime mudstone and skeletal (crinoidal) wackestone with scattered, moderately silicified, colonial corals and small, hemispheroidal stromatoporoids; scattered brachiopods and bryozoans; bedding irregular and poorly developed; some beds are distinctly nodular; this unit extends downslope to Canol Formation shale	35.0	876.0
12	**Limestone:** Light grey weathering and resistant unit; medium grey, thick to very thick planar bedded, fossiliferous mudstones (crinoidal) with scattered stromatoporoids and colonial corals; some trilobites; some fossils silicified and rare chert nodules; this unit is a prominent cliff former near the top of the Ogilvie Formation, but the unit extends down the middle of a dip slope	108.0	841.0
11	**Limestone:** medium grey weathering and slightly recessive unit; dark grey, medium bedded, crinoidal wackestone and packstone; a subordinate fauna of small colonial corals, stromatoporoids and brachiopods; this unit extends down the north-facing dip slope	42.0	733.0
10	**Cherty limestone:** Dark grey weathering and slightly resistant unit; dark grey, very thin to thin bedded lime mudstone; largely unfossiliferous and chert bearing with common thin bands of black chert and bands of black chert nodules; irregular to wavy bedding; unit forms small, resistant ribs down a scree slope just below the summit	42.0	691.0
9	**Limestone:** Medium grey weathering and very resistant unit; dark grey, very thick bedded, crinoidal wackestone and packstone (some brachiopods); local biostromes of stromatoporoid and colonial coral biolithite; thin lenses of lime mudstone 100 m above base of unit; this unit forms the prominent cliffs along the top of this east–west ridge line; the resistant uppermost cliffs of the Ogilvie Formation appear to disappear westward along the ridge	145.0	649.0
8	**Limestone:** Light to medium grey weathering and resistant unit; dark grey crinoid wackestone; many crinoid ossicles contain two holes (*Gasterocoma bicaula*?); scattered corals increase in abundance toward the top of the unit; unit extends upslope toward beginning of ridge line	36.0	504.0

Unit	Description	Unit thickness (m)	Cumulative thickness (m)
7	**Limestone:** Medium to light grey weathering and moderately resistant unit; this unit is formed of two cycles in which intervals of dark to medium grey, thin and nodularly bedded crinoid wackestone are intercalated with intervals of light grey, thick bedded crinoid wackestone and packstone; unit consists of a lower cycle, in which 10 m of nodular thin beds are overlain gradationally by 20 m of thick beds; this is overlain sharply by 54 m of nodularly bedded crinoidal wackestone grading upward to a 24 m thick, thick bedded interval at the top of the unit; the thicker, nodularly bedded interval contains abundant bands of black chert nodules; the topmost interval contains some chert stringers parallel to bedding, but no nodules	108.0	468.0
6	**Limestone:** Light grey weathering and moderately resistant unit; dark grey, medium to thick bedded crinoid wackestone; some irregularly to nodularly bedded intervals; this unit forms a series of small cliffs in the lower part of the Ogilvie Formation	27.0	360.0
5	**Limestone:** Light grey weathering and slightly recessive; medium grey, medium bedded skeletal wackestone with brachiopod, coral and crinoid fragments; this unit is largely scree covered and may, in fact, be argillaceous and gradational with the underlying Michelle Formation	63.0	333.0
Total measured thickness of the Ogilvie Formation is 606.0 m.			
	Michelle Formation		
4	**Argillaceous limestone:** Medium greyish brown weathering and resistant unit; greyish brown, thick to very thick bedded crinoidal wackestone with scattered coral and brachiopod fragments; pinch and swell bedding over a wavelength of tens of metres; upper 30 m is greyer than lower part of unit; some light grey breccia fragments of Ogilvie Formation in brown coloured, argillaceous beds; many of these beds have the appearance of mud-rich debris flows	69.0	270.0
Total measured thickness of the Michelle Formation is 69.0 m.			
	Road River Formation		
3	**Shale and limestone:** Dark brown weathering and recessive unit; dark brownish grey, calcareous and platy shale with tentaculitids along bed partings; a few solitary, thin to medium beds of fossliliferous lime mudstone containing corals, brachiopods and abundant crinoids; these limestones may be debris flows; only scattered outcrop	78.0	201.0
2	**Shale and limestone:** Dark grey weathering and recessive unit; lowermost 8 m is a distinctive interval of thick bedded, grey crinoid lime wackestone that is only slightly argillaceous; crinoids tend to be strung out parallel to bedding with a few scattered coral and brachiopod fragments; this interval may represent debris-flow or turbidite deposition; above this is an interval of black, soft, very thinly laminated shale; the rest of the unit is is moderately hard, brownish grey, calcareous, unfossiliferous shale; some of the more calcareous intervals in the upper part of the unit almost form individual thick beds; some disharmonic slump folds, involving 0.5 m of strata, occur in the upper part of the unit; most of unit is vegetated but outcrops are scattered throughout	63.0	123.0
1	**Shale:** Dark brownish grey and recessive unit; almost entirely vegetated; dark brown platy shale; thickness of unit is an estimate to the top of the underlying ЄDb map unit (Bouvette Formation)	60.0	60.0
Total measured thickness of the Road River Formation is 201.0 m.			
Total measured thickness of Section MTA-86-6 is 876.0 m.			

SECTION MTA-86-7 (24)

This section includes strata of the Bouvette (ЄDb map unit) and the Road River, Michelle and Ogilvie formations. It is located on the east side of the Ogilvie River map area (116G and F, E1/2) about 1 km east of Ogilvie River, due east from Mount Jeckell. The section extends southward down the nose of a ridge and across a small valley bottom. The base of the section is at latitude 65°23'N and longitude 138°14'30"W. It may be seen on RCAF air photo A:13135-107.

	Ogilvie Formation		
8	**Limestone:** Medium bluish grey weathering and resistant unit; medium to dark grey, thick bedded crinoid wackestone; occasional trilobite fragments; many crinoid ossicles appear to have two holes (*Gasterocoma bicaula*?); this unit is the uppermost resistant cliff former of the Ogilvie Formation; above this unit is a dip slope of less resistant dark grey lime mudstones of a more basinal aspect; the contact with the overlying Canol Formation is estimated to be about 100 m above the top of this unit	20.0	863.0
7	**Limestone:** Medium grey weathering and relatively recessive unit; medium grey, medium bedded, faintly laminated lime mudstone with a slight admixture of argillaceous material; smooth weathering with planar bed partings; unfossiliferous and almost lithographic; a few sparse ostracode and/or trilobite fragments; this unit forms the top of the ridge line	45.0	843.0

Unit	Description	Unit thickness (m)	Cumulative thickness (m)
6	**Limestone:** Light to medium grey and resistant unit; dark grey, thick bedded crinoid wackestone in lower part of unit grades upward to very thick to massive bedded, light grey cliffs of coralline wackestone and biolithite with abundant diverse colonial corals (some *Chaetetes*-like corals) and rare stromatoporoids; many crinoids in lower part are two holers	75.0	798.0
Incomplete thickness of the Ogilvie Formation is 140 m (total thickness of Ogilvie Formation estimated at 240 m)			
	Michelle Formation		
5	**Argillaceous limestone:** Medium brownish grey weathering and moderately resistant unit; medium greyish brown, medium to thick bedded, argillaceous lime mudstone; sparse, finely comminuted skeletal fragments; this unit forms cliffs on the lower part of the slope leading upward to the Ogilvie Formation	33.0	723.0
4	**Argillaceous limestone:** Medium to dark greyish brown weathering and recessive unit; this unit is mainly vegetated; it is similar to overlying unit but more argillaceous	90.0	690.0
Total measured thickness of the Michelle Formation is 123.0 m.			
	Road River Formation		
3	**Shale and limestone:** Dark grey weathering and recessive unit; black to dark grey shale and argillaceous limestone; limestone intervals are thin to medium bedded; this unit extends along the valley floor	102.0	600.0
2	**Shale:** Black weathering and very recessive unit; this is a heavily vegetated, soft, dark grey to black shale unit that occupies the valley floor between the more resistant carbonates of the ЄDb map unit and the Michelle and Ogilvie formations; platy shale at base of unit grading upward to buff weathering, calcareous siltstone in uppermost 30 m of unit	72.0	498.0
Total measured thickness of the Road River Formation is 174.0 m.			
	Bouvette Formation (ЄDb map unit)		
1	**Dolostone:** Light grey weathering and resistant unit; medium grey, medium to thick bedded, rather featureless finely to medium crystalline dolostone; scattered vuggy horizons throughout; vaguely fossiliferous and biotubated or mottled; scattered lenses of collapse breccia cemented by white dolomite tend to occur immediately beneath bed contacts; abundant stromatolitic laminae in upper part of unit; this unit extends along and down the nose of a broad ridge; base of the Bouvette Formation is not observed	426.0	426.0
Incomplete thickness of the Bouvette Formation is 426.0 m.			
Total thickness of Section MTA-86-7 is 863.0 m (a total estimated measured section thickness of 963.0 m if 240.0 m of strata are assigned to the Ogilvie Formation).			

SECTION MTA-86-8 (12)

This section includes strata of the upper part of the Road River Formation and part of the Canol Formation. It is located in the southeast corner of the Ogilvie River map area (NTS 116G and F, E1/2) in a quarry about 0.5 km west of the Dempster Highway. The section extends northward up a hillside shale exposure.The base of the section is at latitude 65°05'30"N and longitude 138°24'W. It may be seen on RCAF air photo A:13135-120.

Unit	Description	Unit thickness (m)	Cumulative thickness (m)
	Canol Formation		
5	**Shale:** Dark grey to silver weathering and recessive unit; this unit forms a very poorly exposed cap rock at the top of the hill; platy, silver coloured siliceous fissile shale flakes as scree	20.0	263.0
Incomplete thickness of the Canol Formation is 20.0 m.			
	Road River Formation		
4	**Calcareous siltstone and shale:** Medium to light yellowish brown weathering and slightly recessive unit; yellowish grey, platy and laminated slightly calcareous siltstone and shale; fissile, more recessive intervals alternate with more cemented (calcareous cement) intervals that are almost medium bedded, giving the appearance of rhythmic beds; tentaculitids abundant on bed surfaces; uppermost 20 m of this unit is thin bedded to laminated rusty weathering sooty black shale and siltstone	180.0	243.0
3	**Shale:** Dark brown to buff weathering and recessive unit; rusty weathering, brown silty shale with alternating resistant and recessive intercalations reflecting varying degrees of cementation	33.0	63.0
2	**Limestone and shale:** Light grey to cream coloured weathering and resistant unit; 0.5 m thick intervals of medium yellowish grey, medium bedded, featureless, argillaceous lime mudstone are rhythmically intercalated with thinner, more recessive shaly intervals; thicker beds appear to grade upward to thinner, more shaly intervals and have abrupt contacts with underlying shaly intervals; this unit forms modest cliffs	6.0	30.0
1	**Shale:** Black weathering and very recessive unit; black shale that is very soft and fissile; slightly calcareous; very organic-rich; large calcareous concretions are dotted throughout	24.0	24.0

Unit	Description	Unit thickness (m)	Cumulative thickness (m)
	Incomplete thickness of the Road River Formation is 243.0 m.		
	Total thickness of Section MTA-86-8 is 263.0 m.		
	SECTION MTA-86-9 (37)		
	This section includes strata of the Road River, Michelle and Ogilvie formations. It is located on the east side of the Ogilvie River map area (NTS 116G and F, E1/2) about 10 km northeast of Mount Jeckell near the Dempster Highway. The section extends southwestward up a mountainside. The base of the section is at latitude 65°28'N and longitude 138°13'30"W. It may be seen on RCAF air photo A:13230-7.		
	Ogilvie Formation		
11	**Limestone:** Light to medium bluish grey weathering and very resistant unit; alternating intervals 3 to 7 m thick of medium to dark grey, thick bedded, crinoidal lime mudstone and light grey, thick to very thick bedded crinoid and stromatoporoidal–coralline biolithite; mudstone beds commonly slightly nodular, argillaceous and recessive; fossils tend to be silicified; this unit forms large cliffs on the southwest side of ridge and is overlain by Canol Formation shales	102.0	836.0
10	**Limestone:** Medium grey weathering and recessive unit; entire unit is a scree slope of dark brown to black, very thin to thin bedded, platy lime mudstone	54.0	734.0
9	**Limestone:** Light to medium grey weathering and very resistant unit; dark grey, thick to very thick bedded crinoidal wackestones and mudstones; scattered corals and one thin bed of trilobite wackestone about 5 m above the base of the unit; this unit forms a large cliff along the ridge	40.0	680.0
8	**Limestone:** Medium brownish grey weathering and slightly resistant; medium to dark brown (i.e., tan), medium to thick bedded lime mudstone; almost lithographic; some ostracodes; this unit forms a series of small outcrops up toward the main ridge	96.0	640.0
	Dolomite Member		
7	**Dolostone and limestone:** Medium grey weathering and relatively recessive unit; medium to dark grey, thin bedded, platy, calcareous dolostone and lime mudstone; scattered ostracodes and rare amphiporids; this unit is mainly a talus slope	39.0	460.0
6	**Limestone:** Light to medium grey weathering and resistant unit; lower part of unit is light to medium grey, very thick bedded crinoid wackestone with scattered colonial corals and stromatoporoids; this grades upward to sparsely fossiliferous, dark brownish grey, thick bedded lime mudstone; scattered trilobite and brachiopod fragments occur in upper part	39.0	460.0
5	**Dolomitic limestone:** Medium to light grey weathering and slightly resistant unit; brownish grey to medium grey, medium bedded interbedded crinoid mudstone (dominant), unfossiliferous mudstone and amphiporid-bearing wackestone; a few colonial corals in the crinoidal mudstones; slightly argillaceous; this unit forms a slightly more resistant slope than underlying unit	96.0	421.0
4	**Limestone:** Medium bluish grey weathering and somewhat recessive unit; medium grey to tan, medium bedded lime mudstone that is commonly faintly laminated and contains reworked synsedimentary lithoclasts; some beds dolostone rather than lime mudstone; occasional brown mottling; slightly argillaceous; occasional exposure surfaces with argillaceous seams; possible large ostracodes (*Moelleritia canadensis*?); mainly a talus-covered unit	84.0	325.0
3	**Limestone and dolomitic limestone:** Medium grey to tan weathering and resistant unit; lower 75 m is medium grey, thick bedded crinoidal wackestone with occasional intervals of brachiopod-bearing coralline and stromatoporoidal biolithite; middle 30 m is buff to medium grey weathering, medium bedded lime mudstone with many dolomitic intervals; these beds contain disseminated dark patches of pyrobitumen and are slightly mottled; uppermost 33 m is similar to middle beds but contains abundant laminar to irregular fenestral fabric; this unit forms series of prominent knolls on side of hillslope	138.0	241.0
	Total thickness of the Dolomite Member is 396.0 m.		
	Total measured thickness of the Ogilvie Formation is 733.0 m.		
	Michelle Formation		
2	**Argillaceous limestone and shale:** Medium to dark greyish brown weathering and slightly resistant unit; dark brownish grey, medium to very thick bedded fosiliferous lime mudstone and crinoid wackestone, scattered solitary and colonial corals, brachiopods and tentaculitids; bedding becomes thicker upsection; some brownish grey beds contain breccia fragments of grey lime mudstone and crinoid wackestone; bedding is undulatory to irregular, possibly reflecting intraformational scour and fill by submarine channels	57.0	103.0
	Total measured thickness of the Michelle Formation is 57.0 m.		

Unit	Description	Unit thickness (m)	Cumulative thickness (m)
	Road River Formation		
1	**Calcareous shale:** Light grey to dark brown weathering and recessive unit; brown to black, laminated to thin bedded and fissile silty and calcareous shale; unfossiliferous except for tentaculitids along some bed surfaces	46.0	46.0

Incomplete thickness of the Road River Formation is 46.0 m.

Total thickness of Section MTA-86-9 is 836.0 m.

SECTION MTA-86-10 (18)

This section includes strata of the Bouvette Formation (ЄDb map unit) and unnamed strata of Precambrian age. It is located in the south-central part of the Ogilvie River map area (NTS 116G and F, E1/2) at Mount Skookum Jim. The section extends southwestward across the west side of Mount Skookum Jim. The base of the section is at latitude 65°12'N and longitude 139°03'30"W and may be seen on RCAF air photo A:13230-145.

	Bouvette Formation (ЄDb map unit)		
6	**Dolostone:** White weathering and very resistant unit; strongly recrystallized, coarsely crystalline, white and light grey dolomite; very thick to massive, poorly developed bedding; this dolomite resembles many other replacement dolomites, like the Presqu'ile Dolomite; this unit extends downslope to close to the contact with the overlying Road River Formation	100.0	884.0
5	**Dolostone:** Light grey weathering and resistant unit; light to medium grey, thick to very thick bedded, finely to medium crystalline dolostone; scattered vuggy intervals, particularly beneath locally karstic and erosional bed contacts; some silicification like underlying unit but less prevalent; this unit extends downslope toward the more resistant cliffs of unit 6	318.0	784.0
4	**Dolostone:** Medium grey weathering and resistant unit; entire unit is formed of depositional cycles that are about 1 to 3 m thick; typically, dark brownish grey, thick bedded dolostone intervals grade upward to medium to light grey, thin to medium bedded dololaminite that contains stromatolitic cryptalgal mats with low-amplitude, laterally linked, hemispheroidal stromatolites; these cycles tend to be capped by thin beds of yellow, silty dololaminite containing mudflake breccias; some cycles capped by orange, limonitic, corroded exposure surfaces; lower parts of cycles are burrow mottled and are strongly silicified; locally cycles grade upward from yellowish dololaminites to darker, thick bedded dolostones in apparently deepening-upward, instead of shoaling-upward cycles; this unit forms a large, dark band in the lower part of the ЄDb map unit and it extends upward close to the summit of Mount Skookum Jim	210.0	466.0
3	**Dolostone:** Light grey to medium grey weathering and only slightly resistant unit; dark to light grey, medium to thick bedded, cycles of darker grey, slightly vuggy dolostone grading upward to thinner bedded intervals of light grey dolostone that contain fenestral fabric; some cycles capped by bands of yellow argillaceous, dololaminite with some small domal stromatolites; this unit is slightly more recessive than the underlying unit	96.0	256.0
2	**Sandy dolostone:** Yellowish grey weathering and resistant unit; greyish yellow, thin to medium bedded, silty dololaminite; many intraformational mudflake breccias with a yellow to orange silty and sandy matrix; some fenestral fabric and digitate microstromatolites; this cliff-forming unit strongly resembles the Taiga Formation in the Hart River map area farther east	60.0	160.0

Total measured thickness of the Bouvette Formation (ЄDb map unit) is 784.0 m.

	Unnamed Precambrian		
1	**Quartzite:** Rusty brown weathering and resistant unit, dark rusty to greenish brown, very thin bedded, metamorphosed quartz siltstone and quartzite; wispy, green micaceous bed partings; intimate microfolding of tectonic origin; this unit may be part of the Quartet Supergroup	100.0	100.0

Incomplete thickness of the unnamed Precambrian strata is 100.0 m.

Total thickness of Section MTA-86-10 is 884 m.

SECTION MTA-86-11 (36)

This section includes strata of the Ogilvie, Michelle, Road River and Bouvette formations (ЄDb map unit) and some unnamed strata of Precambrian age. It is located in the central part of the Ogilvie River map area (NTS 116G and F, E1/2) about 10 km north of Mount Chief Isaac. The section extends southward across a series of ridges in the Bouvette and Ogilvie formations. The base of the section is at latitude 65°34'30"N and longitude 139°27'30"W and may be seen on RCAF air photo A:14223-27. This section includes the type section of the Bouvette Formation, a formal formation designed to replace the informal designation "ЄDb map unit" of D.K.Norris (1982). It is named after Mount Bouvette, a prominent mountain formed almost exclusively of the ЄDb map unit and located about 25 km southeast of this section in the southeast part of the Ogilvie River map area.

Unit	Description	Unit thickness (m)	Cumulative thickness (m)
	Ogilvie Formation		
18	**Limestone:** Medium bluish grey weathering and moderately resistant unit; lower 30 m is very dark grey, thick bedded, crinoidal wackestone with poorly developed bedding and rubbly partings; then, 20 m of medium to dark grey, thick bedded stromatoporoid biolithite with hemispheroidal stromatoporoids up to 0.3 m across and strongly silicified; rest of unit is crinoidal wackestone like lower part but large, thin shelled brachiopods become abundant toward the top of the unit; this unit extends down a dip slope toward the contact with the overlying Canol Formation	78.0	1573.0
17	**Dolostone and dolomitic limestone:** Yellowish brown to yellowish grey weathering and slightly recessive unit; mainly yellowish brown, thin to medium bedded, slightly argillaceous and faintly laminated, finely crystalline dolostone with smooth, planar bed partings; some fenestral fabric; some intervals of medium bedded, chocolate brown, mottled dolostone with irregular, lumpy and pinkish grey bed partings; a few resistant, medium beds of dark grey lime mudstone are scattered throughout; this unit extends downslope immediately past the ridge summit cliffs of unit 16	30.0	1495.0
16	**Limestone:** White to cream weathering and very resistant unit; tan, thick to very thick bedded, pelletal lime mudstone with planar, smooth bed partings; some crinoids and a few large colonial corals are scattered throughout, but unit is only sparsely fossiliferous; this unit forms the prominent ridge summit cliff of the Ogilvie Formation	33.0	1465.0
	Dolomite Member		
15	**Dolostone and dolomitic limestone:** light grey to medium brownish grey weathering and slightly recessive; mainly a talus covered slope with little true outcrop; medium bedded white dololaminite is interbedded with medium brownish grey, medium beds of dolomitic lime mudstone and amphiporid and thamnoporid wackestone; fenestral fabric common in dololaminites; white mudchips occur as reworked fragments in the darker beds; this unit extends upward toward summit ridge	57.0	1432.0
14	**Limestone:** medium bluish grey weathering and resistant unit; dark brownish grey, medium to thick bedded crinoid wackestone with irregular, strongly developed bed partings; two-holed crinoid ossicles abundant; large gastropods and thin-shelled brachiopods are scattered throughout; this unit is a prominent cliff former	15.0	1375.0
13	**Dolostone and dolomitic limestone:** light grey to medium brownish grey weathering and slightly recessive; mainly a talus covered slope with little true outcrop; medium bedded, white dololaminite is interbedded with medium brownish grey, medium beds of dolomitic lime mudstone and amphiporid and thamnoporid wackestone that is very organic rich; fenestral fabric common in dololaminites; white mudchips occur as reworked fragments in the darker beds; a little fluorite in some small vugs	99.0	1360.0
12	**Dolomitic limestone:** Bright orange weathering and resistant unit; 10 m of red and orange, medium to very thick bedded dolomitic and argillaceous lime mudstone in the middle of the unit; these beds contain abundant limonitic and pyritic fish bones, teeth and carapaces; most of unit resembles the underlying unit but beds grade upward from yellowish grey to yellowish orange; upper contacts of beds have a nodular aspect; phosphatic fish fragments scattered along some bed contacts; this unit forms a very striking red band near the base of the Ogilvie Formation	85.0	1261.0
11	**Limestone:** Greyish yellow weathering and moderately resistant unit; medium to thick bedded lithographic lime mudstone; individual beds grade upward from medium grey to yellow; upper bed contacts are commonly corroded hardgrounds with scattered fish fragments; yellowish orange chips reworked from underlying bed contacts occur in the grey lower parts of beds above yellowish orange hardgrounds; this unit is mainly talus and rather vegetated, but nonetheless forms some prominent cliffs	39.0	1176.0
10	**Dolostone:** Cream weathering and resistant unit; light grey to cream coloured, thick bedded, dolomitized amphiporid wackestone and packstone; some bitumen in mesopore sized vugs; bedding is poorly developed; this unit is the first large cliff former marking the base of the Ogilvie Formation	12.0	1137.0
Total measured thickness of the Dolomite Member is 307.0 m.			
Total measured thickness of the Ogilvie Formation is 448.0 m.			
	Michelle Formation		
9	**Argillaceous limestone:** Yellowish brown weathering and recessive unit; brown, thin to very thin bedded argillaceous lime mudstone; very little outcrop in this highly vegetated unit and main lithology inferred from scattered platy scree fragments; base of unit is marked by a solitary, thick floatbreccia bed in which subangular breccia clasts of grey crinoid lime mudstone and wackestone are contained within a matrix of greyish brown, argillaceous lime mudstone	45.0	1125.0
8	**Argillaceous limestone:** Brown weathering and recessive unit; a steep, talus-covered and vegetated unit; similar to unit 9 but no resistant beds	69.0	1080.0
Total measured thickness of the Michelle Formation is 114.0 m.			

Unit	Description	Unit thickness (m)	Cumulative thickness (m)
	Road River Formation		
7	**Shale:** Dark grey weathering and very recessive unit; dark grey to black, calcareous, fissile shale; some graptolites; a few interbeds of thin lime mudstone; this unit forms valley floor	117.0	1011.0
	Total measured thickness of the Road River Formation is 117.0 m.		
	Bouvette Formation (ЄDb map unit)		
6	**Dolostone:** Light grey weathering and resistant unit; light grey, very thick to massive bedded, medium to coarsely crystalline dolostone; more massive bedded and recrystallized toward top of unit; zones of very coarse macropore vugs, particularly toward the top of the unit where it closely resembles the Presqu'ile Dolomite at Pine Point, NWT; a zone of massive grey chert occurs in the middle of the unit; unit extends downslope to valley floor; massive cliffs mark the top of the unit	150.0	894.0
5	**Dolostone:** Medium to light grey weathering and very resistant unit; medium to light grey, thick to massive bedded, fine to medium crystalline dolostone; thick to massive bedded cliffs of vuggy, medium to dark grey dolostone interspersed with benches of light grey to white, medium bedded dololaminite containing abundant fenestral fabric; darker beds contain some chert; unit extends along ridge toward final saddle	300.0	744.0
4	**Dolostone:** Medium to dark grey weathering and resistant unit; medium to dark grey, thick bedded, finely crystalline dolostone; some beachrock-like mudchip breccias and oolite-bearing intervals as in unit 3 but less common here; some light grey dololaminite intervals as in underlying unit; some chert in dark grey mottled beds in upper part of unit; units 3 and 4 form the dark lower band of the ЄDb map unit that may be discerned along the base of the ЄDb map unit in this area	150.0	444.0
3	**Dolostone:** Medium to dark grey weathering and resistant unit; medium to dark grey, 20 m thick intervals of medium to thick bedded finely crystalline dolostone are intercalated with 10 m thick intervals of interbedded dololaminite and brecciated, cemented beachrock-type dololaminite gravel, darker intervals contain spectacular bands of oolites and rubble floatstone of tabular dololaminite beachrock fragments; some lenses of carbonate, pea gravel-sized conglomerate within thick beds; many dark beds grade upward to yellowish grey dololaminite in shoaling-upward cycles; mudcracks occur in some dololaminite beds; this unit forms scattered prominent cliffs above the more recessive underlying unit	168.0	294.0
2	**Silty dolostone:** Yellowish grey weathering and slightly resistant unit; Yellowish grey, thick bedded, silty, featureless dolomudstone, some dololaminite with teepee structures and bands of laterally linked hemispheroidal stromatolites; some lenses of mudchip conglomerate in an orange, dolomitic siltstone matrix; this unit forms small, discontinuous cliffs; this unit is probably correlative with the Taiga Formation farther east	96.0	126.0
	Total measured thickness of the Bouvette Formation is 864.0 m.		
	Unnamed Precambrian		
1	**Shaly siltstone and sandstone:** Pink weathering and recessive unit; red silty claystone or mudstone with poorly developed thin bedding in intervals 10 m thick; these are intercalated with 3 m thick intervals of light greyish brown, thin bedded, quartzarenite fine sandstone displaying prominent flaser bedding; red chips occur in sand beds; almost brick-red weathering	30.0	30.0
	Incomplete thickness of the unnamed Precambrian strata is 30.0 m.		
	Total thickness of Section MTA-86-11 is 1573.0 m.		

SECTION MTA-86-12 (25)

This section includes strata of the Ogilvie and Bouvette (ЄDb map unit) formations and some unnamed strata of Precambrian age. It is located in the southwest part of the Ogilvie River map area (NTS 116G and F, E1/2) immediately west of Mount Klotz. The section extends westward across a prominent ridge formed by the Ogilvie and Bouvette formations. The base of the section is at latitude 65°23'30"N and longitude 140°18'W. It may be seen on RCAF air photo A:13231-154.

	Ogilvie Formation		
7	**Limestone:** Medium bluish grey weathering and slightly resistant unit; very dark grey; thin to medium bedded crinoidal lime mudstone and wackestone; nodular, rubbly weathering; local two-holed crinoid ossicles (*Gasterocoma*? *bicaula*); stromatoporoids, colonial corals and brachiopods are common near top of unit; some black chert near top of unit; this unit forms a nearly flat cap rock at summit of hill	75.0	472.0
6	**Calcareous dolostone:** Light grey weathering and recessive unit; intervals, about 1 m thick, of light grey, thin to medium bedded dolomitized lime mudstone containing fenestral fabric alternating with thinner intervals of light grey dololaminite containing local mudcracks on bed surfaces; amphiporids occur in some medium beds; this unit forms a grey band at the base of a prominent hill	15.0	397.0

Unit	Description	Unit thickness (m)	Cumulative thickness (m)
5	**Dolomitic limestone and dolostone:** Light yellowish grey weathering and slightly resistant unit; yellow, thin to medium bedded dololaminite containing bands of calcite-cemented fenestral fabric; slightly argillaceous laminae; this unit forms a bench in the slope; most of the Ogilvie Formation in this section passes to shaly limestone and shale of the Road River Formation immediately north of this section	24.0	382.0
Incomplete thickness of the Ogilvie Formation is 114.0 m.			
	Road River Formation		
4	**Shaly limestone:** Medium to dark brownish grey weathering and recessive unit; brownish grey, very thin to thin bedded, argillaceous lime mudstone and calcareous shale; scattered crinoids and possible fish fragments; bedding slightly wavy with some chert bands of ribbon chert and flat nodules; this unit is transitional to Road River Formation shale	54.0	358.0
Total thickness of the Road River Formation is 54.0 m.			
	Bouvette Formation (ЄDb map unit)		
3	**Limestone:** Medium to light bluish grey weathering and very resistant unit; tan, thick bedded, pelletal packstone and wackestone; very planar bedding with smooth bed partings; a striking, cliff forming unit with "railroad track" continuous beds; top of unit is at brow of hill	165.0	304.0
2	**Dolomitic limestone:** Very light grey to white weathering and moderately resistant unit; partly to completely dolomitized, coarsely recrystallized pelletal packstone and grainstone; thick to very thick bedded; some intervals appear to be dolomitized cycles of pelletal packstone beds interbedded with coarser intraclast grainstones; some dolomite in the lower part of the unit appears to have been dedolomitized, rather than incompletely dolomitized limestones; this unit rests with pronounced angular unconformity on underlying Precambrian strata	129.0	139.0
Total measured thickness of the Bouvette Formation is 294.0 m.			
	Unnamed Precambrian		
1	**Mudstone and dolostone:** Medium to dark greenish grey weathering and moderately resistant unit; greyish green, thin bedded, slightly calcareous and silicified mudstone interbedded with medium grey dolostone; dolostone has thin to medium, continuous bedding and is colour laminated light and dark grey; occasional chert nodules; horneblende diorite is exposed in creek bed along strike with this unit; this unit is part of the orange weathering Precambrian beneath the Bouvette Formation in this area	10.0	10.0
Incomplete thickness of the unnamed Precambrian strata is 10.0 m.			
Total thickness of Section MTA-86-12 is 472.0 m.			

SECTION MTA-86-13 (40)

This section includes strata of the Road River, Michelle and Ogilvie formations. It is located in the central part of the Ogilvie River map area (NTS 116G and F, E1/2) and extends southeastward across a mountain ridge of Ogilvie Formation about 10 km south of Mount Brimstone. The base of the section is at latitude 65°29'N and longitude 139°09'W. It may be seen on RCAF air photo A:13230-138.

	Ogilvie Formation		
8	**Limestone:** Medium bluish grey weathering and very resistant unit; intervals of dark brownish grey, thick bedded crinoidal wackestone containing scattered stromatoporoids and corals are intercalated with intervals of thick to very thick bedded, tan pelletal packstone, sporadic occurrences of fenestral fabric in pelletal packstone intervals; some silicification of fossil material toward the top of the unit; pelletal packstones are very planar bedded and form a series of prominent, rib-like cliffs down a dip slope at the top of the Ogilvie Formation to the contact with shale of the Canol Formation	180.0	803.0
7	**Limestone:** Light grey weathering and very resistant unit; light grey, tan, medium bedded pelletal packstone and pelletal wackestone; some faintly laminated intervals contain fenestral fabric; a few interbeds of dark grey lime mudstone occur near the top of the unit and fewer beds contain fenestral fabric in the upper part of the unit; very planar bedding and smooth weathering; this unit forms the series of small, but prominent, cliffs leading up to the summit of the ridge	165.0	623.0
6	**Limestone:** Dark brownish grey weathering and resistant unit; dark brownish grey, thick bedded crinoid wackestone and mudstone; local large colonial corals and stromatoporoids (up to 0.5 m across) in intervals intercalated with sparsely fossiliferous intervals of crinoid mudstone; this unit forms a series of smaller cliffs beneath the unit 7 cliffs	75.0	458.0

Unit	Description	Unit thickness (m)	Cumulative thickness (m)
5	**Limestone:** Medium to light grey weathering and slightly resistant unit; intervals of dark to medium grey, thin to medium bedded lime mudstone and amphiporid wackestone are intercalated with intervals of light grey to tan, thin bedded and platy, faintly laminated lime mudstone containing fenestral fabric and scattered ostracodes; intervals average about 2 m thick; this unit forms a smooth, largely talus-covered slope leading up to the small cliffs of unit 6	75.0	383.0
4	**Limestone and dolomitic limestone:** Greyish orange weathering and slightly resistant unit; intercalated intervals of light grey weathering, tan, thin bedded and platy lime mudstone and orange weathering, dark grey to tan lithographic lime mudstone in cycles about 2 m thick; fenestral fabric and mudcracks in upper 5 m of unit	54.0	308.0
3	**Limestone and dolomitic limestone:** Medium grey weathering and resistant unit; dark grey to tan, medium to thick bedded, lithographic and dolomitic lime mudstone becoming thicker bedded upsection; a little fenestral fabric in lower, less resistant part of unit; some red, ferruginous, irregular bed partings and prominent stylolites in the upper part of the unit	51.0	254.0
3	**Limestone and argillaceous limestone:** Light grey to tan weathering and slightly resistant unit; dark brownish grey, thick bedded skeletal wackestone; brachiopods dominant in scree-covered lower part of unit and crinoids dominant in upper part; sedimentary breccia beds in upper part of unit with large clasts of grey, crinoidal wackestone in an argillaceous, greyish brown lime mudstone matrix; upper part of unit is thicker bedded and more resistant; this unit is, in part, probably equivalent to part of the Michelle Formation farther east	77.0	203.0
Total measured thickness of the Ogilvie Formation is 677.0 m.			
	Road River Formation		
1	**Argillaceous limestone and calcareous shale:** Dark greyish brown weathering and recessive unit; lower part of unit is medium to dark, very thin bedded, brownish grey, argillaceous lime mudstone; upper part is laminated to very thin bedded, black calcareous, sooty and soft weathering shale with abundant graptolites (mainly biserial); unit extends across a wide, vegetated saddle and rests on dolostone of the ЄDb Map Unit	126.0	126.0
Total measured thickness of the Road River Formation is 126.0 m.			
Total thickness of Section MTA-86-13 is 803.0 m.			

SECTION MTA-86-14 (43)

This section includes strata of the Ogilvie and Road River formations. It is located in the central part of the Ogilvie River map area (NTS 116G and F, E1/2) and extends eastward across a mountain ridge of Ogilvie Formation a few kilometres south of Mount Cluett. The base of the section is at latitude 65°33'30"N and longitude 138°47'W.

Unit	Description	Unit thickness (m)	Cumulative thickness (m)
	Ogilvie Formation		
11	**Limestone:** Medium grey weathering and very resistant unit; medium bedded, dark grey lime mudstone in sigmoidal lenticular beds in lower part of unit may be a channel fill with an eastward paleoslope; these beds are overlain by thick beds of stromatoporoid biolithite containing abundant cabbage-shaped stromatoporoids; lower beds are strongly silicified with abundant black chert nodules parallel to bedding; this unit is the topmost cliff-forming dip-slope part of the Ogilvie Formation and is overlain by the Canol Formation	30.0	755.0
10	**Limestone:** Medium grey to tan weathering and recessive unit; dark brown, thin bedded, platy lime mudstone; unfossiliferous; smooth planar bed partings; unit extends down dip slope	63.0	726.0
9	**Limestone:** Medium grey weathering and very resistant; dark grey, thick to very thick bedded intervals of lime mudstone and crinoidal wackestone are intercalated with thinner intervals of recessive, dark grey, thin to medium bedded, slightly argillaceous crinoidal wackestone; thin bedded intervals have wavy, almost nodular bed partings; many large and two-holed crinoid ossicles; a few bands with abundant brachiopods; this unit forms three prominent cliffs down the dip slope	39.0	663.0
8	**Limestone:** Light to medium grey weathering and recessive unit; medium grey, thin to medium bedded lime mudstone with occasional platy, light grey intraclasts along the bases of beds reworked from underlying, slightly lighter grey upper parts of individual beds; upper part is slightly thicker bedded and contains bands of silicified corals including *Alveolites*?, *Syringopora* and cabbage-shaped stromatoporoids; trilobite carapaces in some lighter coloured beds; this unit continues down the dip slope immediately east of the summit of the north–south ridge	153.0	624.0
7	**Limestone:** Medium bluish grey weathering and resistant unit; tan to brown, medium to thick bedded pelletal? lime mudstone and pelletal wackestone; very planar, smooth weathering beds are separated by thin, argillaceous and platy, recessive intervals imparting a ribbed appearance to the outcrop, which is faintly colour banded lighter and darker grey; almost lithographic; this unit forms small cliffs across the ridge line summit formed by the Ogilvie Formation	96.0	471.0

Unit	Description	Unit thickness (m)	Cumulative thickness (m)
	Dolomite Member		
6	**Dolostone:** Medium brownish grey weathering and resistant unit; medium to dark brownish grey, thick bedded dolomitized amphiporid wackestone; some lighter and darker colour bands; this unit extends upslope to the brow of the summit ridge and forms low cliffs	81.0	375.0
5	**Dolostone:** Light grey weathering and slightly resistant unit; light grey, thin bedded dolomudstone and dololaminite with fenestral fabric; local thin to medium, brownish grey beds of dolomitized amphiporid wackestone; between 37 to 57 m above base of unit, thick bedded, vuggy and rough weathering dolostone is dominant; this is a largely scree-covered unit	81.0	294.0
4	**Limestone and dolomitic limestone:** Yellowish orange weathering and slightly resistant unit; lower part medium yellowish grey, medium to thick bedded lithographic lime mudstone with planar bed partings; medium grey lime mudstone beds grade upward to greyish yellow near the tops of beds; upper parts of beds are argillaceous; upper part of unit is yellowish orange with individual lime mudstone beds grading upward from yellow to orange; upper part of unit is dolomitic and more argillaceous than lower part; some bed parting surfaces contain mudcracks; a few platy intervals; this unit is part of the bright orange marker that occurs throughout the Ogilvie Formation in the west-central part of the Ogilvie map area	84.0	213.0
3	**Dolostone and calcareous dolostone:** Very light grey weathering and slightly recessive unit; mainly scree of light grey, thin bedded faintly laminated dolostone containing fenestral fabric; some darker, thin interbeds of vaguely fossiliferous dolostone; this unit forms a light band beneath the orange marker of unit 4	78.0	129.0
2	**Calcareous dolostone:** Medium greyish brown weathering and resistant unit; brownish grey to medium brown, thick bedded, slightly argillaceous crinoid wackestone with thick, poorly developed and irregular bedding; this unit forms the first resistant cliffs above the Road River Formation	21.0	51.0
Total measured thickness of the Dolomite Member is 345.0 m.			
Total measured thickness of the Ogilvie Formation is 726.0 m.			
	Road River Formation		
1	**Argillaceous and dolomitic limestone:** Medium greyish to yellowish brown weathering and recessive unit; brown, thin bedded and platy argillaceous and dolomitic lime mudstone and crinoidal mudstone; unit is almost entirely vegetated but is slightly more resistant than the underlying shale of the Road River Formation; this unit may be correlative with the Michelle Formation farther east	30.0	30.0
Incomplete thickness of the Road River Formation is 30.0 m.			
Total thickness of Section MTA-86-14 is 756.0 m.			

SECTION MTA-86-15 (11)

This section includes strata of the Bouvette (ЄDb map unit), the Taiga and Slats Creek formations and unnamed Precambrian strata. It is located in the southeastern part of the Hart River map area (NTS 116H) and extends generally northward across a mountain ridge near Mount Dempster. The base of the section is at latitude 65°04'30"N and longitude 136°15'W. It may be seen on RCAF air photo A:13137-85.

	Bouvette Formation (ЄDb map unit)		
7	**Dolostone:** Very light grey and resistant unit; very light grey to white, very thick bedded and slightly vuggy dolostone; many dolomitized, pisolitic, grainstone intervals with thick planar bedding; this unit forms a very light grey band at the top of the ЄDb map unit; unit extends downslope and the top of the unit is the contact with the Road River Formation	130.0	1200.0
6	**Dolostone:** Light grey weathering and resistant unit; similar thick bedded and vuggy dolostone as underlying unit but more silicification and chert bands; one striking chert band 10 m thick at 45.0 m above base of unit; resistant unit that extends over the second prominent summit along the ridge line	265.0	1070.0
5	**Dolostone:** Very light grey weathering and resistant unit; very light grey, thick to very thick bedded vuggy dolostone; vuggy zones tend to be concentrated along the upper contacts of individual beds, which have a corroded, karst-like appearance; zones of white dolomite-cemented crackle breccia; yellowish dololaminite occur at the top of some thick beds; some sporadically silicified zones; this unit forms low cliffs along the first summit	315.0	805.0
4	**Dolostone:** Medium to dark grey weathering and moderately resistant unit; medium to dark grey, thick to very thick bedded cherty dolostone; scattered massive bands of black chert; some zones of laterally linked, closely spaced, hemispheroidal stromatolites; uppermost 30 m of unit is dominantly thick bedded, intraclastic grainstone with imbricate texture (beachrock?); lighter dark grey and medium grey bands tend to be thinner bedded and laminated; middle part of unit is colour banded; this unit forms a prominent dark band at the base of the Bouvette Formation	210.0	490.0
Total measured thickness of the Bouvette Formation is 920.0 m.			

Unit	Description	Unit thickness (m)	Cumulative thickness (m)
	Taiga Formation		
3	**Silty dolostone:** Orange weathering and very resistant unit; Orangish grey, medium to thick bedded silty dolostone; irregular laminated fabric; orange sandy and granule conglomerate lenses near the base of the unit; rippled sand lenses at base of unit; this unit forms discontinuous orange cliffs above the recessive Slats Creek Formation sandstone	18.0	280.0
	Total measured thickness of the Taiga Formation is 18.0 m.		
	Slats Creek Formation		
2	**Sandstone:** Yellowish to brownish, orange weathering and recessive unit; orangish brown, thin bedded quartzarenite fine sandstone; some ripple cross-stratification; scattered solitary medium beds of sandy conglomerate with chert pebbles up to 2 cm across; this unit forms a vegetated bench along the ridge line	12.0	262.0
	Total thickness of the Slats Creek Formation is 12.0 m.		
	Unnamed Precambrian		
1	**Phyllite:** Dark greyish green weathering and slightly resistant unit; dark grey, thin bedded, platy phyllitic shale; siliceous; unit is largely vegetated	250.0	250.0
	Incomplete thickness of unnamed Precambrian strata is 250.0 m.		
	Total thickness of Section MTA-86-15 is 1200.0 m.		

SECTION MTA-86-16 (55)

This section includes strata of the Mount Dewdney and Bouvette formations and unnamed Precambrian strata. Strata of the Dewdney Formation, as defined in this study, were previously included in the Kutchin Formation of A.W. Norris (1985) and in the Tatsieta Formation of Pugh (1983). The Bouvette Formation is equivalent to the ЄDb map unit (Norris, D.K., 1985). It is located near the southern edge of the Porcupine River map area (NTS 116J and K, E1/2) and extends northward up the nose of a large ridge that forms part of Mount Burgess. The base of the section is at latitude 66°01'N and longitude 139°36'W. It may be seen on RCAF air photo A:13139-43.

Unit	Description	Unit thickness (m)	Cumulative thickness (m)
	Mount Dewdney Formation		
7	**Argillaceous dolostone:** Light greyish yellow to orange weathering and moderately resistant unit; varicoloured yellow, greyish brown and orange, thin to medium bedded argillaceous and silty dolostone; planar bed partings and common fenestral fabric; a few thin, grey quartzarenite sandstone beds; thin skeletal wackestone beds near base of unit containing crinoids, trilobite and ostracode fragments; the upper surfaces of many thin beds in the lower part of the unit are stained yellowish orange and are irregular in detail, perhaps indicating that they were hardgrounds or firmgrounds; this unit is less resistant than the underlying ЄDb map unit but does form a small knob-like cliff with a rounded profile beneath the cliff-forming Ogilvie Formation	40.0	962.0
	Total measured thickness of the Mount Dewdney Formation is 40.0 m.		
	Bouvette Formation (ЄDb map unit)		
6	**Limestone:** Medium bluish grey weathering and resistant unit; tan, medium to thick bedded pelletal lime mudstone and pelletal wackestone; smooth weathering with planar bed partings; no obvious fossils; this unit forms the uppermost angular cliffs of the ЄDb map unit	50.0	922.0
5	**Dolostone:** Light to medium grey weathering and resistant unit; light grey, medium to thick bedded, strongly recrystallized and slightly vuggy, medium crystalline dolostone; similar to underlying unit but less resistant and thinner bedded	300.0	872.0
4	**Dolostone:** Very light grey weathering and resistant unit; very light grey, thick to very thick bedded, strongly recrystallized and vuggy, coarsely crystalline dolostone; massive bands of black chert at 35 to 51 m above base of unit; top of unit is very thick bedded with massive chert bands; this unit extends up to crest of ridge formed by the ЄDb map unit	222.0	572.0
3	**Dolostone:** Light to medium grey weathering and resistant unit; medium grey, medium to thick bedded, medium crystalline dolostone; slightly vuggy with coarsely recrystallized patches and white dolomite cement; some bands of dolomitized intraclast grainstone with imbricated centimetre-sized coated compound "bahamite"-type limeclasts that may have been beach deposits; dololaminite occurs in the upper parts of some beds; patches of light grey chert occur in many beds; this unit extends upslope with a series of low cliffs	189.0	350.0
2	**Dolostone:** Dark grey weathering and resistant unit; dark grey, thick bedded, finely crystalline dolostone; many dark beds of intraclast "bahamite"-type grainstone as in the overlying unit; some distinctly oolitic bands; bands of abundant irregular masses of dark grey to black chert are common; this is the lower, dark band of the ЄDb map unit that occurs throughout the Ogilvie and Porcupine map areas	141.0	161.0
	Total measured thickness of the Bouvette Formation is 902.0 m.		

Unit	Description	Unit thickness (m)	Cumulative thickness (m)
	Unnamed Precambrian		
1	**Dolomitic siltstone:** Light red, or pink weathering and recessive unit; red, platy, very thin bedded dolomitic siltstone; almost entirely a scree-covered and partly vegetated unit that forms a recessive bench beneath the resistant dolostones of the ЄDb map unit	20.0	20.0

Incomplete thickness of the unnamed Precambrian strata is 20.0 m.

Total thickness of Section MTA-86-16 is 962.0 m.

SECTION MTA-86-17 (56)

This section includes strata of the Ogilvie and Mount Dewdney formations and is immediately adjacent to Section MTA-86-16. This section also includes the type sections of the Mount Dewdney and Ogilvie formations. It is located near the southern edge of the Porcupine River map area (NTS 116J and K, E1/2) and extends westward across a large ridge immediately north of Mount Burgess and Section MTA-86-16. The base of the section is at latitude 66°03'N and longitude 139°35'30"W. It may be seen on RCAF air photo A:13139-43.

	Ogilvie Formation		
9	**Limestone:** Light bluish grey weathering and resistant unit; intervals of dark grey, medium to thick bedded amphiporid and thamnoporid wackestone and lime mudstone pass upward to very thick bedded, light grey coralline and stromatoporoidal lime mudstone and biolithite in large, cliff-forming bedding cycles that are several tens of metres thick; bands or lenses of the large, robust brachiopod *Stringocephalus* occur at 190 m above the base of the unit; this unit is overlain by the typical rusty, silicified platy shales of the Canol Formation	210.0	939.0
8	**Limestone:** Dark grey weathering and recessive; dark grey, medium to thick bedded lime mudstone and crinoid wackestone; rubbly weathering; discontinuous, almost nodular bedding; scattered crinoid ossicles and occasional trilobite fragments; unit extends across a creek and is slightly vegetated	234.0	729.0
7	**Limestone:** Light to medium grey weathering and moderately resistant; lower 35 m is tan, thick bedded, pelletal wackestone with smooth planar bedding; this is overlain by an interval of more recessive, rubbly weathering, dark grey coralline (solitary horn corals) and amphiporid wackestone with poorly developed, medium to thick bedding with irregular bed partings; this middle interval occupies most of the unit; fossil material tends to be silicified; top of unit is marked by a short interval of light grey, very thick bedded, pelletal and intraclast packstone with some moderate-sized (20 cm across) hemispheroidal stromatoporoids (i.e., cabbage-shaped); top of unit marked by a cliff, but overall not as resistant as the underlying unit	126.0	495.0
6	**Limestone:** Light to medium grey and very resistant unit; entire unit is rhythmically bedded; medium grey, thick bedded intervals of coralline and stromatoporoid biolithite and wackestone are separated by thinner bedded intervals of dark grey crinoid wackestone and lime mudstone that contain scattered brachiopods; fossil material tends to be silicified and zones of well defined black chert nodules are scattered throughout; coralline and stromatoporoid biolithite beds are dominant in the upper part of the unit and are strongly silicified; this unit forms a series of prominent cliffs leading up to the ridge summit	135.0	369.0
5	5 **Limestone:** Light to medium grey weathering and moderately resistant unit; intervals of dark grey, medium bedded, almost lithographic, lime mudstone grade upward to intervals of medium grey, thick to very thick bedded crinoidal wackestone and packstone in bedding cycles that are tens of metres thick; medium bedded intervals have irregular bed partings and contain sparse crinoid fragments; many crinoid ossicles display two central canals (*Gasterocoma*? *bicaula*); this unit extends upslope to the more resistant cliffs of the overlying unit	48.0	129.0
4	**Limestone:** Medium grey weathering with some thin orange bands and moderately resistant unit; medium grey to tan, thin bedded and platy intervals of lime mudstone alternate with solitary medium and thick lime mudstone beds or groups of beds in rhythmically bedded intervals several metres thick imparting a ribbed weathering appearance to the unit; the thinner bedded recessive intervals tend to have slightly argillaceous, pink and orange stained bed partings; irregular hardgrounds occur at the tops of some beds; a zone of calcite cemented vertical burrows, with individual burrows about 2 to 3 cm long, occurs 29 m above the base of the unit; this unit is not cliff forming	48.0	129.0

Total measured thickness of the Ogilvie Formation is 858.0 m.

	Mount Dewdney Formation		
3	**Dolostone and sandy dolostone:** Yellowish orange weathering and slightly resistant unit; thin to medium bedded, silty and sandy buff dolostone with smooth bed partings; fenestral fabric common; lenses of sand and reworked mudflakes occur in the middle and upper parts of the unit; this unit changes thickness rapidly along strike as may be seen by comparing the thicknesses of the Mount Dewdney Formation in this section with the immediately adjacent Section MTA-86-16	70.0	81.0
2	**Argillaceous and silty calcareous dolostone:** orange weathering, slightly recessive; greyish and greenish orange, thin to very thin bedded, argillaceous, calcareous and silty dolostone with irregular, pyritic bed partings; these bed partings may contain numerous coalescent hardgrounds	10.0	11.0

1	**Chert conglomerate:** silicified, rusty brownish red to black weathering chert pebble conglomerate that is discontinuous along strike; this unit directly overlies the tan limestones of the Bouvette Formation	1.0	1.0

Total measured thickness of the Mount Dewdney Formation is 81.0 m.

Total thickness of Section MTA-86-17 is 939.0 m.

SECTION MTA-86-19 (31)

This section includes strata of the Michelle and Ogilvie formations. It is located in the south-central part of the Ogilvie River map area (NTS 116G and F, E1/2) and extends southeastward across the southern flank of Mount Chief Isaac. The base of the section is at latitude 65°27'N and longitude 139°25'W. It may be seen on RCAF air photo A:14223-28.

Ogilvie Formation

10	**Limestone:** Light to medium grey weathering and resistant unit; lowermost 15 m is recessive, thin to medium bedded, platy light grey, laminated lime mudstone with smooth, planar bed partings; this is overlain by 25 m of medium grey, medium to thick bedded stromatoporoid wackestone and biolithite with abundant, densely packed hemispheroidal stromatoporoids (individual stromatoporoids up to 25 cm across); uppermost 20 m of unit is medium grey weathering, medium bedded, dark grey crinoid wackestone with abundant fragments of ramose corals and stromatoporoids (i.e., amphiporids) with uneven bed partings; this unit is the only unit in this section to contain observable crinoid fragments; it extends down a dip slope and is overlain by the rusty weathering shales of the Canol Formation	60.0	637.0
9	**Limestone:** Medium bluish grey weathering and resistant unit; lowermost 15 m is rhythmically bedded with intervals of medium grey, very thick bedded lime mudstone several metres thick separated by thinner, more recessive intervals of platy, light grey, laminated lime mudstone; small scour fills (10-20 cm across) occur in the laminite; above this interval the recessive laminites disappear and the unit is medium to dark grey, thick to very thick bedded lithographic lime mudstone that contains scattered small corals and bryozoans; this part of the unit is evenly, but irregularly, almost nodularly, bedded; uppermost 5 m is a spectacular, very thick but poorly bedded, biostromal rudite with abundant silicified hemispheroidal stromatoporoids, amphiporids, thamnoporids and other corals; this unit extends up to summit cliffs of ridge	48.0	577.0
8	**Limestone:** Yellowish grey, almost cream weathering and resistant unit; medium to light grey, medium to thick bedded lime mudstone; individual beds grade upward to yellowish grey, faintly laminated, dolomitic lime mudstone in upper parts of beds; bedding is very thick between 21 and 30 m above the base of the unit; several very thick coralline and stromatoporoidal (e.g., alveolitids) biolithite beds occur in this interval; contacts separating thick beds tend to be orange-stained irregular hardgrounds; this unit is less resistant than overlying unit	45.0	529.0
7	**Limestone:** Yellow weathering and slightly resistant unit; Dark to medium grey, slightly argillaceous and dolomitic, medium to thick bedded lime mudstone that weathers a distinctive cream to yellow; even, planar bedding with rusty, red stained, irregular and argillaceous bed partings (hardgrounds?); reworked mudclasts along bed surfaces; upper parts of thick beds are faintly laminated and contain fenestral fabric; some reworked thamnoporid corals occur along bed contacts; this unit forms a distinctive yellow band within the Ogilvie Formation; upper part of unit is mainly talus	51.0	484.0
6	**Limestone:** Medium bluish grey weathering and resistant unit; tan coloured, medium bedded lithographic lime mudstone (pelletal?); sparse trilobites in lower part of unit; large ostracodes common throughout and brachiopods in upper part of unit; fenestral fabric occurs in the upper parts of some beds near the top of the unit; this unit forms a series of small cliffs along a ridge spur	90.0	433.0
5	**Limestone:** Dark grey weathering and moderately resistant unit; dark grey to black, thin to medium bedded crinoidal lime mudstone and wackestone; planar to irregular bed partings; two-holed crinoid ossicles common (*Gasterocoma bicaula*); slightly mottled and dolomitic in upper part of unit; a few beds of amphiporid wackestone near base of unit; soft sediment deformation of beds near their upper contacts with overlying beds; this unit forms a series of low outcrops along the ridge	60.0	343.0

Dolomite Member

4	**Calcareous dolostone:** Light to medium grey weathering and slightly recessive unit; medium grey, medium to thin bedded, finely crystalline dolostone; largely featureless with occasional laminae and fenestral fabric; occasional amphiporid-bearing beds; some synsedimentary lithoclast breccias (reworked mudchips?); this unit is mainly scree covered	120.0	283.0
3	**Dolomitic limestone and calcareous dolostone:** Orangish grey weathering and recessive unit; medium grey, thin bedded and platy dolomitic lime mudstone; common fenestral fabric; some dololaminite; occasional amphiporid wackestone; largely a scree covered unit	93.0	163.0
2	**Limestone:** Medium bluish grey weathering and resistant unit; medium grey, thick bedded crinoid lime mudstone with occasional brachiopod-bearing zones; discontinuous, green, argillaceous partings are scattered throughout, imparting a nearly nodular appearance to the unit; this unit forms the basal cliff of the Ogilvie Formation	37.0	30.0

Total measured thickness of the Dolomite Member is 250.0 m.

Unit	Description	Unit thickness (m)	Cumulative thickness (m)
Total measured thickness of the Ogilvie Formation is 604.0 m.			
	Michelle Formation		
1	**Silty limestone:** Orangish to brownish grey weathering and recessive unit; dark brownish grey, silty and thin to medium bedded, fossiliferous lime mudstone and skeletal wackestone; crinoid and brachiopod fragments abundant; scattered, rusty weathering pyrite nodules up to 3 cm in diameter; most of unit is scree covered but thicker, more resistant beds outcrop in upper part of unit	33.0	33.0
Incomplete thickness of the Michelle Formation is 33.0 m.			
Total thickness of Section MTA-86-19 is 637.0 m.			

SECTION MTA-86-21 (20)

This section includes strata of the Ogilvie and Road River formations. It is located in the southwest part of the Hart River map area (NTS 116H) a few kilometres west of Blackstone River and it extends northwestward from the valley floor, mapped as Road River Formation up to the summit of a low ridge mapped as Ogilvie Formation. The base of the section is at latitude 65°13'30"N and longitude 137°56'W. It may be seen on RCAF air photo A:13230-11.

Unit	Description	Unit thickness (m)	Cumulative thickness (m)
	Ogilvie Formation		
4	**Limestone:** Light to medium bluish grey weathering and slightly resistant unit; medium grey, very thin to medium bedded crinoid lime mudstone and wackestone containing corals and brachiopod fragments; some medium beds are distinctly graded and may be resedimented mass-flow (i.e., debris-flow) deposits; uppermost 35 m of unit is very thin bedded, argillaceous and platy and contains only sparse crinoids but more abundant tentaculitids along bed partings; two-holed crinoids (*Gasterocoma*? *bicaula*) throughout; this unit is distinctly more resistant than underlying units and extends across the low ridge summit up to the covered contact with Canol Formation shales	70.0	365.0
Total measured thickness of the Ogilvie Formation is 70.0 m.			
	Road River Formation		
3	**Limestone:** Dark grey weathering and recessive unit; dark grey, medium to thick bedded crinoid lime mudstone; similar to unit 2 but here and there are some intervals, about 2 m thick, of platy, thin to medium bedded lime mudstone; black chert nodules abundant at 25.0 m above the base of the unit; this unit extends across a largely vegetated flat with scattered outcrop	35.0	290.0
2	**Limestone:** Medium grey weathering and recessive unit; dark grey to black, medium to thick bedded crinoid wackestone, packstone (i.e., encrinite) and lime mudstone; some thinner bedded brachiopod-bearing intervals; bryozoans and favositid colonial corals are scattered throughout the thicker beds; some beds have scoured bases; tentaculitids occur along some bed partings in thinner bedded intervals; thicker bedded intervals are almost nodularly bedded; unit extends up scree slope on flank of low ridge	96.0	255.0
1	**Argillaceous limestone:** Dark grey weathering and recessive unit; mainly very dark grey, medium bedded, sparsely fossiliferous and argillaceous lime mudstone; solitary and colonial corals and brachiopods are dominant in the fauna of the lower part of the unit whereas crinoids are abundant in the upper part; black chert masses common; scoured bases to some beds may indicate mass-flow deposits; this unit is underlain by very recessive Road River shales in the valley bottom	159.0	159.0
Incomplete thickness of the Road River Formation is 295.0 m.			
Total thickness of Section MTA-86-21 is 365.0 m.			

SECTION MTA-86-22 (33)

This section includes strata of the Ogilvie Formation. It is located in the southwest part of the Ogilvie River map area (NTS 116G and F, E1/2) a few kilometres east of Ettrain Creek, and it extends westward from a fault contact with Cretaceous strata on the valley floor, across a mountain ridge mapped as Ogilvie Formation. The base of the section is at latitude 65°27'15"N and longitude 140°47'30"W. It may be seen on RCAF air photo A:13137-30.

Unit	Description	Unit thickness (m)	Cumulative thickness (m)
	Ogilvie Formation		
6	**Limestone:** Light to medium grey weathering and resistant unit; lower 7 m is tan, medium bedded skeletal intraclast packstone with planar, smooth bedding; this is overlain by a more massive cliff of rubbly weathering, dark grey crinoidal and coral wackestone or biolithite with in situ corals and bulbous hemispheroidal stromatoporoids and discontinuous, irregular bedding; trilobites and brachiopods are abundant in some beds in the lower part of the unit	25.0	365.0

Unit	Description	Unit thickness (m)	Cumulative thickness (m)
5	**Limestone:** Medium brownish grey weathering and moderately resistant; lower 40 m of unit is dark grey, medium to thin bedded crinoid and other skeletal wackestones with scattered colonial coral, brachiopod and stromatoporoid fragments; upper 30 m is medium to light grey, thin to medium bedded, intraclast and skeletal packstone and grainstone with some clearly reworked, orange-stained mudchip-type lithoclasts in the packstone beds; lower part of unit is irregularly to nodularly bedded whereas the upper part is characterized by wavy to planar bedding with smooth bed partings; abundant large and small brachiopods in upper part of unit and two-hole crinoid ossicles (*Gasterocoma*? *bicaula*) abundant in lower part; this unit forms a series of small cliffs	70.0	340.0
4	**Limestone:** Medium to light grey weathering and only slightly resistant unit; dark to medium grey, medium bedded crinoid wackestone grades upward to medium to thick bedded coralline and stromatoporoidal rudite with abundant colonial coral (alveolitid, favositid type corals), crinoid, brachiopod and stromatoporoid (bulbous) fragments; the unit is capped by a few metres of intraclast crinoid packstone and grainstone in thin, wavy beds; intraclasts appear to be slightly reworked mudchips; the upper part of the unit is more resistant and forms small cliffs	78.0	270.0
3	**Limestone:** Light grey weathering and very resistant unit; medium grey, thick to very thick bedded intervals alternate rhythmically with thinner, light grey to cream, medium bedded intervals in bedding cycles 2 to 7 m thick; thicker bedded intervals are crinoid wackestone and packstone; thinner intervals are laminated dolomitic lime mudstone which contains fenestral fabric; uppermost cliff-forming thick bed is strongly recrystallized and contains abundant intercrystalline bitumen; this unit is the main cliff former of the Ogilvie Formation in this section	81.0	192.0
2	**Limestone:** Light grey weathering and slightly recessive unit; coarsely recrystallized, light tan to white, thick bedded crinoid wackestone; abundant intercrystalline black bitumen; some fragments of thinner beds display fenestral fabric; lower part of unit is talus-covered but upper part forms a series of low, rounded cliffs; tectonic brecciation and veining throughout	81.0	111.0
1	**Limestone:** Light grey weathering and recessive unit; similar to overlying unit with white, recrystallized crinoid wackestone and/or packstone but is entirely talus covered; this unit overlies Cretaceous strata with a fault contact	30.0	30.0

Incomplete thickness of the Ogilvie Formation is 365.0 m.

Total thickness of Section MTA-86-22 is 365.0 m.

SECTION MTA-86-25 (7)

This section includes strata of the Road River Formation, the Bouvette Formation (ЄDb Map Unit) and unnamed Precambrian strata. It is located in the north-central part of the Dawson map area (NTS 116B and C, E1/2) at the headwaters of a tributary of the Tatonduk River and it extends northward over a mountain ridge formed primarily of the ЄDb map unit. The base of the section is at 64°52'30"N latitude and 139°32'W longitude.

Road River Formation

7	**Shale:** Dark silvery grey weathering and recessive unit; fissile and platy dark grey to black shale with local thin interbeds of limestone and platy, dark grey chert; slightly silicified shale has rust-coloured partings; biserial graptolites are abundant as impressions along bed surfaces; this unit is at the base of the dip slope	20.0	1207.0

Incomplete thickness of the Road River Formation is 20.0 m.

Bouvette Formation (ЄDb Map Unit)

6	**Dolostone:** Bluish grey weathering and resistant unit that forms a distinct small ridge north of a creek crossing; medium to light grey, medium to thick bedded finely crystalline and slightly calcareous dolostone; possibly this was a pelletal lime mudstone or pelletal wackestone before dolomitization; very smooth and planar bed partings	117.0	1187.0
5	**Dolostone:** Medium grey weathering and resistant unit; the upper part of the unit is more recessive and forms the main dip slope leading down to a small creek; unit tends to be medium to dark grey at base grading upward to medium to light grey toward top of unit; medium grey, medium to very thick bedded featureless, finely to medium crystalline dolostone with some silicified and cherty, stromatolitic horizons formed of laterally linked, small, hemispheroidal to digitate stromatolites (this unit bears some resemblance to parts of the Franklin Mountain Formation of the Mackenzie Mountains)	360.0	1070.0
4	**Dolostone:** Light to medium grey weathering and slightly recessive unit that forms a low part of the ridge line; cream to light grey and thick bedded vuggy dolostone that is similar to that in underlying units; some less vuggy, medium bedded intervals with a blotchy yellow colouration	171.0	734.0
3	**Dolostone:** Light grey weathering and resistant unit that leads up to the ridge summit; light grey, thick bedded, coarsely crystalline and vuggy dolostone; uppermost 30 m of unit is very smooth bedded and bluish grey dolostone with planar, well defined bed partings interbedded with medium bedded intervals of light grey, dominantly dololaminite that contains abundant fenestral fabric	159.0	563.0

Unit	Description	Unit thickness (m)	Cumulative thickness (m)
2	**Dolostone:** Medium to light grey weathering and resistant unit; light grey, finely to medium crystalline dolostone that is medium bedded in lower part of unit but thick bedded in upper part; top 20 m is a prominent dark band with abundant chert, some fenestral fabric and small bands of crinkly stromatolites	204.0	404.0

Total measured thickness of the Bouvette Formation is 987.0 m.

Unnamed Precambrian

1	**Sandstone and shale:** Dark grey weathering and resistant unit that forms a vegetated, lower, gentle slope leading up to the steeper slope formed of the ЄDb map unit; light grey, thin to medium bedded, fine to medium grained sandstone; quartzarenite separated by interbeds of wavy bedded, dark grey shale partings; some low-angle crossbeds; greenish grey micaceous partings define wavy bed partings in sandstone intervals (this unit resembles the Quartet Group)	200.0	200.0

Incomplete thickness of the unnamed Precambrian strata is 200.0 m.

Total thickness of Section MTA-86-25 is 1207.0 m.

SECTION MTA-86-26 (54)

This section includes strata of the Road River, Ogilvie and Canol formations. It is located in the north-central part of the Ogilvie River map area (NTS 116G and F, E1/2) about 4 km north of Mount Whitney, and it extends southward across low ground and across a low ridge formed of a rather thin Ogilvie Formation. The base of the section is at 65°41'30"N latitude and 139°36'W longitude. The section is well shown on RCAF air photo A:13135-185.

Canol Formation

6	**Siliceous shale:** Dark grey to silvery grey weathering and recessive unit that forms a distinct saddle above and below the more resistant Ogilvie and Hart River formations; dark grey to black, platy and siliceous shale, nonfossiliferous; there is very little outcrop in this unit	240.0	556.0

Total measured thickness of the Canol Formation is 240.0 m.

Ogilvie Formation

5	**Limestone:** Medium to dark bluish grey weathering and resistant unit that forms a series of small knolls along the Ogilvie ridge crest and the dip slope down to the vegetated contact with the overlying Canol Formation; dark grey to black, thick to very thick bedded skeletal wackestone; hemispheroidal stromatoporoids and colonial corals common in lower part of unit along with brachiopods and gastropods; crinoids absent in lower part but are present in upper part (no two-holers observed); some biostromal beds in lower part; bedding in upper part is thinner (medium bedded) but lower biostromal part of unit is almost massive bedded	180.0	316.0
4	**Limestone:** Light to medium grey weathering and slightly resistant unit; very dark grey to black, thin to medium bedded, sparsely fossiliferous lime mudstone; rare brachiopod, trilobite and tentaculitid fragments; a few thin interbeds of skeletal and intraclast packstone; nodular bedding dominates upper half of unit but lower half is rubbly weathering and relatively unfossiliferous; some pyrobitumen in small vugs; a few weakly crossbedded intervals of medium planar bedded pelletal? lime mudstone (or wackestone) are scattered in upper part of unit; unit extends up a scree-covered slope toward the ridge summit and the more resistant overlying unit	21.0	136.0

Total measured thickness of the Ogilvie Formation is 201.0 m.

Road River Formation

3	**Shale:** Black weathering and very recessive unit that extends across a sloping vegetated saddle that leads up to the foot of the resistant ridge formed of Ogilvie Formation strata; black, sooty and very fissile, slightly calcareous shale; no outcrop, but shale brought up to ground surface by small rodents	45.0	115.0
2	**Shale and limestone:** Medium brownish grey weathering and recessive unit that extends downslope to sloping saddle; intervals of platy, very thin bedded grey lime mudstone alternate with intervals of brownish grey, calcareous shale; graptolite impressions abundant along some bed partings	15.0	70.0
1	**Silicified limestone and shale:** Silver, grey and buff weathering and recessive unit; base of unit, which rests immediately upon limestone of the Bouvette Formation, is particularly recessive and is sooty, dark grey to black shale interbedded with dark grey thin lime mudstone beds; rest of unit is silicified, silver to buff weathering, medium grey shale with some distinct chert bands; graptolites common along some bed surfaces at 20 to 40 m above the base of the unit	55.0	55.0

Total measured thickness of the Road River Formation is 115.0 m.

Total thickness of Section MTA-86-26 is 556.0 m.

Unit	Description	Unit thickness (m)	Cumulative thickness (m)
	SECTION MTA-86-28 (21)		
	This section includes strata of the Precambrian Tindir Group and the lower Paleozoic Jones Ridge Limestone. It is located in the southwest corner of the Ogilvie River map area (NTS 116G and F, E1/2) at the headwaters of Tindir Creek. It extends southward across a prominent, solitary ridge that is an outlier of Jones Ridge Limestone resting on Precambrian strata of the Tindir Group. The base of the section is at 65°16'30"N latitude and 140°55'W longitude. The section is well shown on RCAF air photo A:13784-33.		
	Jones Ridge Limestone		
6	**Silicified dolostone:** Medium grey weathering and very resistant unit that forms the uppermost cliffs of the Jones Ridge Limestone; upper part of unit is an unusual sequence of thick to very thick bedded, dolomitized and partly silicified pisolitic packstones and grainstones; some thick beds of rubble floatbreccia formed of silicified tabular to equant fragments, up to 20 cm long, of weakly laminated dolostone; many pisolitic beds are distinctly graded and crossbedded; thick bedded strata in lower part of unit are formed of more finely fragmental packstones with thin, silicified grey bands that outline metre-scale, low-angle crossbedding; a large, rusty brown to orange weathering 20 to 30 m wide subvertical diorite porphyry dike, which intersects the entire Jones Ridge Limestone and extends downward into the underlying Tindir Group, was examined and sampled at the top of this unit	170.0	530.0
5	**Dolostone:** Yellow weathering and slightly recessive unit that forms a yellow marker within the Jones Ridge Limestone; lower part of unit is yellow, shaly, thin bedded aphanocrystalline to finely crystalline, finely laminated dolostone; upper part of unit is less argillaceous or shaly, yellowish grey to medium grey laminated, thin to medium bedded dolostone	66.0	360.0
4	**Dolostone and chert:** Yellowish grey weathering and slightly recessive unit that forms a broad bench in the ridge line; this unit is formed of two bedding cycles of platy and shaly, soft weathering yellow dololaminite that grade upward to more resistant, cherty, partly silicified yellowish grey, thin bedded dolostone and laminated chert; some beds of brecciated chert laminite; some chert nodules are scattered within the upper parts of intervals of yellow dololaminite	96.0	294.0
3	**Dolostone:** Cream weathering and very resistant unit that forms the lower cliffs of the Jones Ridge Limestone; light to medium grey, thick to very thick bedded medium crystalline dolostone; many beds of chert pebble floatbreccia containing equant to platy chert clasts; most beds contain silicified platy clasts that are faintly laminated (possibly originally stromatolitic?); a large mass of grey silicification associated with minor faulting occurs in the middle of the unit	138.0	198.0
	Incomplete thickness of the Jones Ridge Limestone is 470.0 m.		
	Tindir Group		
2	**Limestone and shale:** dark grey weathering and recessive unit beneath the prominent cliffs of the Jones Ridge Limestone; mainly dark grey, platy lime mudstone with argillaceous partings and calcareous, brownish grey shale; a few thin beds of chert pebble conglomerate occur in the lower part of the unit; unit grades upward to buff to yellow weathering, stromatolitic, dololaminite with thin, wavy bedding; contact with overlying unit is fairly abrupt but gradational in detail	30.0	60.0
1	**Limestone:** Medium grey weathering and resistant, cliff-forming unit within the Tindir Group; medium grey, medium to thick bedded faintly laminated pelletal? or intraclastic lime wackestone; silicification outlines laminae; laminated patches disrupted in places and some beds are breccia formed of platy laminite clasts	30.0	30.0
	Incomplete thickness of the Tindir Group is 60.0 m.		
	Total thickness of Section MTA-86-28 is 530.0 m.		
	SECTION MTA-86-P1 (10)		
	This section includes strata of the Road River and Ogilvie formations. It is located in the southeast corner of the Ogilvie River map area (NTS 116G and F, E1/2) about 8 km west of the Dempster Highway near the headwaters of Engineer Creek. It extends northward up an exposed face of Road River shale beneath a resistant ridge cap rock of Ogilvie Formation. The base of the section is at 65°03'30"N latitude and 138°34'W longitude. The section is well shown on RCAF air photo A:13135-48.		
	Ogilvie Formation		
2	**Limestone:** Light yellowish grey weathering and slightly resistant unit that forms the cap rock of a low, vegetated ridge; a rythmically bedded unit of medium grey, thin bedded crinoidal wackestones and packstones intercalated with intervals of yellowish grey shale; many crinoid beds are graded and display sharp, wavy basal contacts (debris flows?); many crinoid ossicles with two holes; this unit is overlain by siliceous shales of the Canol Formation	25.0	75.0
	Total measured thickness of the Ogilvie Formation is 25.0 m.		

Unit	Description	Unit thickness (m)	Cumulative thickness (m)
	Road River Formation		
1	**Shale:** Dark grey weathering and recessive unit; mainly a dark grey to black shale talus slope with a few, hard interbeds of dark grey lime mudstone	50.0	50.0

Incomplete thickness of the Road River Formation is 50.0 m.

Total thickness of Section MTA-86-P1 is 75.0 m.

SECTION MTA-86-P2 (26)

This section includes strata of the Road River and Ogilvie formations. It is located in the west-central part of the Ogilvie River map area (NTS 116G and F, E1/2) about 3 km northwest of Mount Klotz. It extends eastward across a low ridge formed of Road River and Ogilvie formations. The base of the section is at 65°24'N latitude and 140°06'W longitude. The section is well shown on RCAF air photo A:13231-154.

	Ogilvie Formation		
4	**Limestone:** Medium to light grey weathering and resistant unit; mainly medium to dark grey, medium to thick bedded lime mudstone; upper part of unit is fossiliferous; many horizons of silicified thamnoporid-like ramose corals; a few large heads of *Favosites* and rare stromatoporoids occur near the top of the unit; most of unit is not particularly crinoidal but some encrinite (crinoid packstone/grainstone) beds occur near the top of the unit; silvery shale of the Canol Formation overlies this unit	70.0	180.0
3	**Limestone:** Dark grey weathering and recessive unit; black, medium bedded, organic-rich lime mudstone with sparse crinoids in upper part of unit	40.0	110.0

Total measured thickness of the Ogilvie Formation is 110.0 m.

	Road River Formation		
2	**Shale and limestone:** Dark grey weathering and recessive unit; dark grey, medium to thick bedded lime mudstone intercalated with soft black shale in a nearly rythmically bedded sequence; some thick beds near top of unit	60.0	70.0
1	**Shale:** Dark grey weathering and very recessive unit at the floor of the valley; dark grey soft shale and calcareous platy shale	10.0	10.0

Incomplete thickness of the Road River Formation is 70.0 m.

Total thickness of Section MTA-86-P2 is 180.0 m.

SECTION MTA-86-P4 (46)

This section includes strata of the Road River and Ogilvie formations. It is located in the northwest part of the Ogilvie River map area (NTS 116G and F, E1/2) near the headwaters of Nation River. It extends southwestward across a low ridge formed of Road River and Ogilvie formations. The base of the section is at 65°35'45"N latitude and 140°34'W longitude. The section is well shown on RCAF air photo A:13138-228.

	Ogilvie Formation		
2	**Limestone:** Medium to light grey weathering and moderately resistant unit; medium grey, thick bedded coralline and stromatoporoidal lime wackestone with abundant, silicified thamnoporid-type and syringoporid-type corals; this unit forms the resistant cap rock of the ridge and is sharply overlain by siliceous silver- and rust-coloured shale of the Canol Formation in the valley floor to the west	50.0	210.0

Incomplete thickness of the Ogilvie Formation is 50.0 m.

	Road River Formation		
1	**Shale and limestone:** Medium to dark brownish grey weathering and slightly recessive unit; entire unit is formed of three bedding cycles in which recessive, dark brownish grey shales with very thin beds of dark grey lime mudstone grade upward to resistant, medium bedded, medium grey lime mudstone that forms a series of resistant ribs at the tops of these cycles; the lower two cycles are about 60.0 m thick each and the top cycle is 40.0 m thick; this unit is transitional between dark grey, soft Road River shale underneath and the more resistant Ogilvie above	160.0	160.0

Incomplete thickness of the Road River Formation is 160.0 m.

Total thickness of Section MTA-86-P4 is 210.0 m.

Unit	Description	Unit thickness (m)	Cumulative thickness (m)
	SECTION MTA-88-1		
	This section includes strata of the Ogilvie and Vunta formations and is the type section of the “Kutchin Formation” (Norris, A.W., 1985). The strata are assigned here to the Dolomite Member of the Ogilvie. The section extends eastwards up a mountain ridge on the east side of the White Mountains in the northeast corner of the Bell River map area (116P) near the headwaters of Fish Creek. The base of the section is at 67°55'15"N latitude and 136°32'50"W longitude and may be seen on RCAF air photo A:15462-37.		
	Ogilvie Formation-Dolomite Member		
13	**Limestone and dolostone:** Medium grey weathering and resistant unit that forms small cliffs; medium to thick bedded intervals of amphiporid packstone and wackestone alternate with calcareous light grey and slightly yellow-stained dolostone; this unit is the upper part of the basal, light grey dolomitic beds of the Ogilvie Formation below darker grey limestones that dominate the upper part of the Ogilvie Formation	63.0	699.5
12	**Dolostone:** Recessive talus slope of light grey dolostone rubble; thin to medium planar bedded, very finely crystalline dolostone; some fenestral fabric	48.0	636.5
11	**Dolostone:** Light grey almost cream weathering resistant unit; medium to dark grey finely crystalline dolostone; medium smooth and planar bedded with a few thick to very thick orange stained beds; some fenestral fabric; scattered small vugs partly occluded by coarsely crystalline white calcite and bitumen	63.0	588.5
10	**Dolostone:** Light grey almost cream weathering resistant unit; medium to dark grey, finely crystalline dolostone that forms a series of ridgeline cliffs; medium smooth and planar bedded; some fenestral fabric; scattered small vugs with calcite and bitumen	120.0	525.5
9	**Dolostone:** Greyish yellow weathering and recessive but slightly blocky unit; light grey to cream dolomicrite; planar medium bedding with slightly irregular bedding (some beds are greyer and calcareous)	42.0	405.5
	Total measured thickness of the Dolomite Member is 336.0 m.		
	Incomplete thickness of the Ogilvie Formation is 336.0 m.		
	Delorme Group		
	Tatsieta Fomation?		
8	**Dolostone:** Yellow to light orange weathering, slightly recessive unit, which serves as an orange marker unit; light grey to cream, medium bedded dolomicrite; poorly defined but distinct mudcracks and red stained, mainly subvertical calcite veins are present throughout	30.0	363.5
	Total measured thickness of the Tatsieta Formation is 30.0 m.		
	Peel Formation?		
7	**Dolostone and limestone:** Greyish yellow weathering, slightly resistant unit that marks change in ridge slope; yellow-stained, medium bedded, finely crystalline dolostone with planar but slightly irregular bed partings; orange stained calcite fills scattered biogenic vugs (probably leached *Amphipora* and ramose colonial corals); several intervals of grey, thin to medium bedded, intraclastic lime wackestone with greenish yellow argillaceous partings; some mudcracks in platy lime mudstones; intraclasts and finely comminuted skeletal material occur in pockets on bed partings	34.5	333.5
6	**Limestone:** Medium grey weathering, recessive and platy to rubbly unit for which there is no in-place exposure; similar but not as dark as unit 4; rubbly portion is bioturbated, platy and slightly argillaceous at base	39.0	299.0
5	**Dolomitic limestone:** Medium grey weathering and very resistant unit forming small, prominent cliffs; medium grey, medium to thick bedded stromatoporoid wackestone at base grades upward to very thick bedded stromatoporoid boundstones; some stromatoporoids silicified; a few thin bedded platy interbeds separate thick resistant stromatoporoid beds; a few corals present; stromatoporoids globular near base, becoming large and hemispherical to lamellar at top of unit; some yellow and orange staining	36.0	260.0
4	**Limestone:** Very recessive and platy to rubbly weathering unit with almost no outcrop in place; this unit forms a very dark grey weathering stripe on ridge; lower part is platy, skeletal, burrowed lime wackestone containing abundant thamnoporid-like corals, amphipora and crinoids and irregular, orange, discontinuous, argillaceous partings due to bioturbation; upper part rubbly with abundant silicified (black) stromatoporoids and a few, small, colonial corals (favositids and syringoporids)	36.0	224.0
3	**Limestone and dolostone:** Medium grey weathering, slightly and resistant coralline wackestone (rudstone) with ramose thamnoporoid-like corals (though some ramose corals have linear ornamentation along sides); medium planar beds; abundant brachiopods and amphiporids; irregular orangish bed partings; medium to dark grey, planar, smooth, medium beds of buff, orange weathering dolostone interbeds toward top of unit; top of unit marked by a single, thick, dolostone bed; thin, brick coloured calcite veins are abundant in the dolostones; the lower contact of this unit with strata of the underlying Vunta Formation is covered but is broadly irregular and may be unconformable	42.5	188.0

Unit	Description	Unit thickness (m)	Cumulative thickness (m)
Total measured thickness of the Peel Formation is 188.0 m.			
Total measured thickness of the Delorme Group is 218.0 m.			
	Vunta Formation		
2	**Limestone:** Light grey weathering, resistant unit, slightly less resistant than underlying unit; a thick, planar, smooth bedded pelletal packstone with some calcispheres and ostracodes; some grainstone present; some intervals display distinct, large-scale depositional wedges several metres thick and tens of metres broad	100.5	145.5
1	**Limestone:** medium to light grey weathering and very resistant cliff-forming unit; medium grey pelletal and intraclastic lime wackestone that has thick to very thick, poorly developed bedding, and contains veins and breccia masses throughout; no fauna present; very coarsely crystalline calcite with curved crystal faces	45.0	45.0
Incomplete thickness of the Vunta is 145.5 m.			
Total thickness of Section MTA-88-1 is 699.5 m.			
	SECTION MTA-88-2		
This section includes strata of the Vunta Formation and is part of the type section for the Vunta (see Norford, 1964). This section extends southeastward down Vunta Creek, largely along the south side of the creek, to the upper contact of the Vunta Formation with the overlying Delorme Group immediately east of the confluence of Vunta Creek with Fish Creek. The base of the section is at 67°56'N latitude and 136°34'W longitude. It may be seen on RCAF air photo A:15462-37.			
	Vunta Formation		
18	**Limestone:** Light to medium grey weathering with alternating resistant and recessive intervals; thick bedded, resistant intervals of medium grey pelletal wackestone are separated by slightly thicker, recessive intervals of thin bedded, dark grey, skeletal and pelletal wackestone and packstone; unconformable wavy contact with overlying, orange weathering, argillaceous lime mudstones of the Peel Formation	33.0	576.5
17	**Limestone:** Medium grey weathering and recessive unit; dark grey skeletal and intraclast (bahamite?) lime packstone with thin to medium, discontinuous, wavy to lenticular bedding; crinoids common	10.5	543.5
16	**Limestone:** Light grey weathering, resistant and cliff-forming unit; medium grey pelletal wackestone with fairly continuous, thick bedding with discontinuous irregular partings	15.0	533.0
15	**Limestone:** Medium grey weathering and somewhat recessive unit; dark grey skeletal and intraclastic (bahamite?) packstone/grainstone with thin to medium, discontinuous, wavy and lenticular bedding with irregular partings; contains fine to coarse sand-sized carbonate fragments and a moderate abundance of crinoid fragments	21.0	518.0
14	**Dolomitic limestone:** Slightly yellowish grey weathering unit that is rather recessive, with the exception of a thick bed at the top of the unit; medium grey mottled pelletal wackestone with dolomitic yellow mottling of pervasive bioturbation	15.0	497.9
13	**Limestone:** Light to very light grey weathering and moderately resistant unit; medium to thick, broadly wavy to lenticular bedded light grey pelletal packstone and grainstone (probably sand wave deposition) with pervasive, dolomitic, cream coloured mottling (not in burrows but perhaps intergranular)	13.5	482.0
12	**Limestone:** Light to medium grey weathering unit that is a resistant band forming one side of the creek bed; medium grey to darker grey pelletal lime wackestone (some packstone but more mud matrix than in underlying unit); very thick bedded, particularly at the top of the unit	30.0	468.5
11	**Dolomitic limestone:** Light to very light grey weathering and moderately resistant unit which ends at a stream; medium, broadly wavy to lenticular bedded, light grey pelletal packstone and grainstone; pervasive dolomitic, cream mottling (not in burrows but perhaps intergranular); this unit is similar to unit 13	97.5	438.5
10	**Limestone:** Medium grey weathering unit, slightly resistant near its base to more resistant with small cliffs at the top of the unit; mottled, with cream coloured dolomitic mottling (bioturbation); crinoid-bearing lime mudstone beds are interbedded with thick beds containing abundant black chert nodules and silicified corals; these thick beds have very irregular planar beds with pervasive, discontinuous thin partings; crinoids are common in all beds; matrix of dark grey, finely comminuted skeletal material with large crinoids	100.5	341.0
9	**Limestone:** Medium grey weathering and very resistant unit; a major cliff former; very thick, continuously bedded dark grey fossiliferous lime mudstone and skeletal wackestone; abundant amphiporids, scattered colonial corals, crinoids, gastropods	21.0	240.5
8	**Limestone:** Light grey weathering and slightly recessive unit that forms a wide area in the creek; slightly dusty (possibly slightly argillaceous) dark grey lime mudstone that is mainly medium bedded but with a sprinkling of thin to thick beds; continous bedding with irregular partings along which orange material is found; probably bioturbated	45.0	219.5

Unit	Description	Unit thickness (m)	Cumulative thickness (m)
7	**Limestone:** Light grey weathering, moderately resistant unit, but less so than underlying unit; medium grey lime mudstone with pervasive fenestral fabric	22.5	174.5
6	**Limestone:** Medium to light grey weathering, resistant and cliff forming unit; very thick bedded, medium grey lime mudstone with abundant laminar fenestral fabric; a few recessive, light to very light grey intervals of pelletal packstone; this unit forms a more resistant interval along the creek	31.5	152.0
5	**Limestone and dolostone:** Medium to light grey weathering and slightly recessive unit; mainly grey-mottled, cream coloured dolomitic pelletal lime mudstone; thin to medium planar bedding with abundant dolomitic fenestral fabric	27.0	120.5
4	**Limestone:** Light to medium grey weathering and moderately resistant unit that crosses a fault zone; medium to thick planar bedded, light grey pelletal mudstone with fenestral fabric; thickness uncertain as dips flatten out on south side of gully	27.0	93.5
3	**Calcareous dolostone:** Greyish cream weathering and resistant unit (but less resistant than unit 2); buff, calcareous, finely crystalline dolostone with smooth, planar, thin to medium, continuous bedding laminated with fine fenestral fabric; this rock type appears to interfinger with rocks like those of unit 2	13.5	66.5
2	**Limestone:** Light grey weathering, resistant and cliff forming unit; medium grey pelletal? lime mudstone that has very planar, very smooth, very thick continuous "railroad track"-like bedding with abundant fenestral fabric; very hard, almost lithographic	49.5	53.0
1	**Limestone:** Medium to light grey weathering and moderately resistant unit; thick, irregularly bedded medium grey skeletal wackestone and packstone; mottled yellowish cream with linear *planolites*-like burrows that weather in relief; brachiopods, large gypidulid?-like brachiopods; abundant small crinoids; almost a packstone with comminuted skeletal material; accurate thickness data is impossible to acquire beneath this unit because the valley floor widens and bedding has inconsistent dips due to structural complications; it is likely that the top of the dolomite of map unit C1 of Norris (1981) is 100 to 200 m stratigraphically below this unit	3.5	3.5

Incomplete thickness of the Vunta Formation is 576.5 m.

Total thickness of Section MTA-88-2 is 576.5 m.

SECTION MTA-88-3

This section includes strata of the Ogilvie and Peel formations, as well as strata from an unnamed Carboniferous formation. It extends eastwards up a mountain ridge on the east side of the White Mountains in the northeast corner of the Bell River map area (116P) near the headwaters of Fish Creek 1 km north of Section MTA-88-1. The base of the section is at 67°55'45"N latitude and 136°32'W longitude and may be seen on RCAF air photo A:15462-37. This section and Section MTA-88-1 can be regarded as forming a single composite section.

Lisburne Group

13	**Dolomitic siltstone:** Dark brown weathering and recessive unit; dark brown dolomite-cemented siltstone with thin, discontinuous and rather indistinct bedding; very distinctive, large (about 5.0 cm in diameter and tens of centimetres long) cylindrical rugose corals indicating a Late Carboniferous age (probably Moscovian) (bothrophyllid coral - identified by E.W. Bamber); this unit is overlain abruptly by very resistant, cliff-forming siliceous limestones of Permian age	32.0	881.5

Total thickness of the Lisburne Group is 32.0 m.

Ogilvie Formation

12	**Limestone:** Brownish to orangish grey weathering, moderately resistant unit forming small cliffs; medium to thick, planar continuous bedding with slightly irregular partings; fossiliferous lime mudstone and skeletal wackestone; abundant silicified thamnoporid corals and algal material; pervasive orange staining particularly near top of unit; contact with overlying Lisburne Group is sharp but not well exposed	123.0	849.5
11	**Limestone:** Light grey weathering unit forms upper massive cliff; massive poorly developed bedding; dark grey skeletal wackestone with abundant two-holed crinoids, corals and stromatoporoids	69.0	726.5
10	**Limestone:** Moderately resistant unit; dark grey, slightly crinoidal, thick to very thick beds of lime mudstone alternate with medium, more recessive beds showing planar continuous bedding	27.0	657.5
9	**Limestone:** Dark to medium grey weathering rather recessive unit; intervals of dark grey amphiporid lime wackestone alternate with intervals of lime mudstone, which has medium, very planar bedding; this unit is dominated by alternating medium and dark intervals with platy partings; well developed continuous planar bedding; this unit is capped by a single, thin bed of light grey (white) calcareous dolostone with good fenestral fabric	57.0	630.5

Unit	Description	Unit thickness (m)	Cumulative thickness (m)
8	**Limestone:** Medium to light grey weathering, very resistant unit which, although rubbly along the line of section, forms masive cliffs elsewhere; thick to massive bedded stromatoporoid (big cabbage heads) and coralline wackestone; amphiporid beds near the top and a light grey laminite caps the unit; alveolitids and thamnoporids common; fauna light grey in a darker mottled lime mud	73.5	573.5
7	**Limestone:** Resistant unit which forms small cliffs; medium beds of light grey lime mudstone alternate with intervals of thin black and dark grey fossiliferous (ostracodes) lime mudstone beds; slightly irregular bed partings with pink stain; amphiporids occur in some thicker beds as well as some stromatoporoids	34.5	500.0
	Dolomite Member		
6	**Dolomitic limestone:** Very light to light grey weathering and very resistant cliff forming unit; medium to thick bedded with planar, very smooth bedding; thinner beds with fenestral fabric; scattered sparse amphiporids; pervasive, irregular, dolomitic, cream coloured mottling	75.0	465.5
5	**Dolostone:** Very light grey weathering recessive unit forming scattered small cliffs; thin to medium planar, smooth bedded, light grey dolomicrite and finely crystalline dolostone; common laminar fenestral fabric; some thicker beds have *Amphipora*	91.5	390.5
4	**Dolostone:** Medium grey weathering very resistant unit that forms steep part of ridge line with serrated medium cliffs; lower portion uniformly medium bedded, medium to light grey dolostone with abundant fenestral fabric; thin bedded, recessive, laminated yellowish orange and yellow interbeds 2 to 3 m thick alternate with 3 to 5 m thick medium to thick grey dolostone	117.5	299.0
Total measured thickness of the Dolomite Member is 284.0 m.			
Total thickness of the Ogilvie Formation is 668.0 m.			
	Delorme Group		
	Tatsieta Formation		
3	**Dolostone:** Light grey to yellowish grey weathering unit which is neither recessive nor resistant; medium, very planar, smooth bedded dolomicrite (mainly), with some thin beds, many of which are laminated; most beds featureless with small, calcite-filled vugs; unit ends with an orange weathering, slightly argillaceous marker that correlates with the orange marker of unit 8 at the top of the Peel Formation of Section MTA-88-1, 1 km south of this section	89.0	181.5
Total measured thickness of the Tatsieta Formation is 89.0 m.			
	Peel Formation		
2	**Dolostone:** Light grey weathering resistant unit that forms a series of small, prominent cliffs; very planar, medium bedded light grey dolostone with some discontinuous, thin, laminated parting beds (slightly wavy and stromatolitic); poorly developed, calcite-cemented fenestral fabric in some medium beds	60.0	92.5
1	**Dolostone:** Yellowish grey weathering, somewhat recessive and blocky unit with little in-place outcrop; light buff coloured dolostone, probably medium to thick bedded; intensely fractured and veined with white sparry calcite; the lower contact with the Vunta Formation is several tens of metres below this unit and is covered	32.5	32.5
Incomplete measured thickness of the Peel Formation is 92.5 m.			
Incomplete measured thickness of the Delorme Group is 181.5 m.			
Total thickness of Section MTA-88-3 is 881.5 m.			

SECTION MTA-88-4

This section includes strata of the C1 map unit of Norris (1981) on the northwest side of the White Mountains. The section extends southeastward up a mountain ridge towards the contact of the C1 map unit with the overlying C2 map unit of Norris (1981) near the northern limit of the Bell River map area (116P). The base of the section is at 67°58'30"N latitude and 136°46'W longitude. It may be seen on RCAF air photo A:15462-36.

C_1 Map Unit

8	**Shale and siltstone:** Banded orange and green weathering and moderately recessive unit; green bands, about 10 m thick, of lenticular, fissile, noncalcareous shale alternate with intervals of platy to thin bedded, bright orange, dolomitic or calcareous siltstone; Lower Cambrian trilobites in green shale 13.0 m below top of unit (*Olenellus* sp. - latest Early Cambrian); this unit is abruptly overlain by grey, medium bedded dolostone and yellowish orange, platy, silty dolostones and dolostone breccias of the C2 map unit	60.0	306.0
7	**Quartzite and shale:** Dark grey to medium grey weathering very resistant unit that forms prominent cliffs; siliceous impure litharenite and quartzarenite in thick, thin to medium bedded intervals with a few intervals 1 to 2 m thick of lavender shale	27.0	246.0

Unit	Description	Unit thickness (m)	Cumulative thickness (m)
6	**Silty shale:** Deep pinkish red or lavender weathering recessive unit; poorly developed platy bedding and some green mottling; small worm tubes; green silty shale dominates in upper part	16.5	219.0
5	**Sandy dolostone:** Resistant orange marker unit; light orange, intensely brecciated and fractured sandy dolostone with thin to medium planar but irregular bedding; fractures and breccia matrix are very sandy but the dolostone is only moderately sandy	9.0	202.5
4	**Shale and mudstone:** Medium to light greyish green weathering very recessive unit that extends across a broad saddle and up the ridge to prominent orange cliffs of the overlying unit; grey mudstone; shale across saddle becomes medium bedded mudstone on hillside	66.0	193.5
3	**Quartzitic sandstone:** Very resistant unit that forms prominent knobs and which weathers brownish grey at base to grey at top; lower part brown to rusty grey litharenites; medium to fine sandstone; thin to medium bedded with festoon-type crossbeds toward middle of unit becoming thick bedded and grey to white impure quartzite at top	63.0	127.5
2	**Shale (minor sandstone):** Rusty to yellowish orange weathering and recessive unit; thin, platy bedded, olive green and grey silty shale; thick bedded more resistant intervals of shale impart a thick bedded appearance to the upper part of the unit	33.0	64.5
1	**Dolostone:** Very light grey weathering unit which is neither recessive nor resistant; thin, planar bedded, light grey, finely crystalline dolostone with irregular partings becoming thicker bedded toward top of unit; featureless but highly fractured and veined with orange stained calcite; this unit has irregular strikes and dips	31.5	31.5

Incomplete thickness of C_1 Map Unit is 306.0 m.

Total thickness of Section MTA-88-4 is 306.0 m.

Appendix 6
Part 1: Biostratigraphic determinations from surface sections

Format for entries:

Section or locality
GSC locality number and paleontological report
Name of stratigraphic unit containing faunal sample and height in metres above base and (below top) of this stratigraphic unit. Plus sign (+) indicates contact not exposed
Fauna and System/Stage

Section 8 (MTA-82-1)

1. GSC loc. C-124503 (A.W. Norris, 11-AWN-1985)
Bouvette 653.0+ (150.0)
stromatoporoid, bulbous; alveolitid; coenitid; *Favosites* sp.; cf. *Gypidula boucoti* Lenz (1977b); *Desquamatia filistriata* Lenz (1977a)
Davidsoniatrypa johnsoni Fauna of Jackson, Lenz and Pedder (1978), Pragian, Lower Devonian

2. GSC loc. C-124508 (A.W. Norris, 11-AWN-1985)
Road River 124.0 (40.0)
cf. *Nowakia* sp.; *Styliolina* sp.
Pragian to Frasnian, Devonian

Section 13 (MTA-82-2)

1. GSC loc. C-124515 (B.S. Norford, C-D 5 BSN 1986)
Bouvette 372.5 (0.0)
stromatoporoid; solitary coral; *Catenipora* sp.; ?*Favosites* sp.; trilobite fragment
Silurian, or Upper Ordovician

Section 41 (MTA-82-3)

1. GSC loc. C-124524 (A.W. Norris, 11-AWN-1985)
Landry 230.5 (93.5)
cf. *Nowakia* sp.; cf. *Styliolina* sp.
Pragian to Frasnian, Devonian

2. GSC loc. C-124525 (T.T. Uyeno, 10-TTU-87)
Mount Baird 58.0 (0.0)
Polygnathus? sp. (indet. anterior fragment)
possibly Devonian to Upper Carboniferous

Section 22 (MTA-82-5)

1. GSC loc. C-124534 (A.W. Norris, 11-AWN-1985)
Road River 183.5 (343.0)
Gypidula pelagica lux Johnson Boucot and Murphy; *Atrypa nieczlawiensis* Kozlowski; cf. *Volynites* sp.; echinoderm ossicle with single axial canal
Gypidula pelagica Fauna of Jackson, Lenz and Pedder (1978), lower Lochkovian, Lower Devonian

Section 19 (MTA-82-6)

1. GSC loc. C-124545 (A.W. Norris, 5-AWN-1986)
Hume 20.0 (0.0+)
Thamnopora sp.; *Spinulicosta* sp.; *Emanuella* sp.; *Spinatrypa* sp.; *Fuscinipyge yolkini* Ormiston; ostracodes - numerous; echinoderm ossicle with single axial canal; echinoderm ossicle with five-sided axial canal; echinoderm ossicle with five-pointed star-shaped axial canal; five-sided echinoderm ossicle with circular axial canal
probably *adoceta* Zone of Crickmay (1960), lower Eifelian, lower Middle Devonian

Section 32 (MTA-82-8)

1. GSC loc. C-124557 (A.W. Norris, 11-AWN-1985)
Hume 30.0 (+0.0)
Favosites sp.; undet. cup coral; *Desquamatia aperanta* (Crickmay); echinoderm ossicle with single axial canal; very large diameter echinoderm column
Eoschuchertella adoceta Zone of Crickmay (1960), Eifelian, lower Middle Devonian

Section 44 (MTA-82-9)

1. GSC loc. C-124560 (B.S. Norford, O-8 BSN 1995)
Franklin Mountain 341.0+ (34.0)
?*Ophileta* sp., trilobite debris
probably Lower Ordovician

2. GSC loc. C-124561 (B.S. Norford, O-8 BSN 1995)
Mount Kindle 17.5 (294.5)
Palaeophyllum sp., ?*Favistina* sp., ?*Bighornia* sp., orthid brachiopod fragments, echinoderm debris
probably Richmondian or Gamachian, Upper Ordovician

Section 57 (MTA-82-12)

1. GSC loc. C-124573 (B.S. Norford, C-D 5 BSN 1986)
Road River 95.0 (631.0)
Dendrograptus sp.; *Dictyonema* sp.
probably Upper Cambrian

2. GSC loc. C-124574 (A.W. Norris, 11-AWN-1985)
Road River 526.0+ (164.0)
Lingula sp.; cf. *Orbiculoidea* sp.
age not determined, long-ranging genera

3. GSC loc. C-124575 (B.S. Norford, C-D 5 BSN 1986)
Road River 625.0 (101.0)
orthid brachiopod; ?*Dichograptus* or ?*Tetragraptus* sp.
Lower Ordovician

4. GSC loc. C-124580 (B.S. Norford, C-D 5 BSN 86)
Road River 659.0 (67.0)
graptolite fragment
Ordovician or Silurian

Section 9 (MTA-82-13)

1. GSC loc. C-124584 (B.S. Norford, C-D 5 BSN 1986 and A.W. Norris, 6-AWN-1986)
Road River 102.0 (556.0)
Nowakia acuaria (Richter); *Styliolina* sp.; dendroid graptolite; *Monograptus yukonensis* Jackson and Lenz
Lower Devonian, Pragian, *yukonensis* Zone and *acuaria* Zone

2. GSC loc. C-124585 (B.S. Norford, C-D 5 BSN 1986 and A.W. Norris, 6-AWN-1986)
Road River 172.0 (486.0)
Guerichina strangulata Bouček and Prantl; *Nowakia* sp. cf. *N. acuaria* (Richter); *Styliolina* sp.; *Monograptus yukonensis* Jackson and Lenz
Lower Devonian, Pragian, *yukonensis* Zone, *strangulata* Zone, upper Pragian

3. GSC loc. C-124586 (A.W. Norris, 11-AWN-1985)
Road River 238.0 (420.0)
orthoconic cephalopod; *Nowakia* sp.; *Viriatella* sp.
Zlichovian to about mid-Frasnian, Devonian

4. GSC loc. C-124587 (A.W. Norris, 11-AWN-1985)
Road River 329.0 (329.0)
cf. *Mimagoniatites* sp.; *Styliolina* sp.
Anetoceras Fauna, upper Zlichovian, Lower Devonian

Section 16 (MTA-82-15)

1. GSC loc. C-124591 (A. Pedder, DWM-134-AEHP-88)
Bouvette 686.0+ (10.0)
undetermined, but pre-Devonian

2. GSC loc. C-124601 (B.S. Norford, C-D 5 BSN 1986)
Road River 210.0 (285.0+)
?*Climacograptus* sp.; ?*Glyptograptus* sp.; ?*Leptograptus* sp.; *Orthograptus* sp.; cheirurid trilobite aff. *Proromma*
probably Middle Ordovician, possibly Upper Ordovician or Lower Silurian

Section 14 (MTA-82-16)

1. GSC loc. C-124062 (B.S. Norford, O 1-BSN 1994)
Road River 150.0 (571.0+)
inarticulate brachiopods; orthid brachiopod, *Chonetoidea* sp.; agnostid, asaphid, pliomerid and indeterminate trilobites; ?*Mendolaspis* sp.
Middle Ordovician, Llanvirn to Caradoc

2. GSC loc. C-124603 (B.S. Norford, O 1-BSN 1994)
Road River 220.0 (501.0+)
?*Climacograptus* sp.; *Dicranograptus* sp.
Middle Ordovician

3. GSC loc. C-124605 (B.S. Norford, O 1-BSN 1994)
Road River 420.0 (301.0+)
?*Glyptograptus* sp.
probably Middle Ordovician

4. GSC loc. C-124606 (B.S. Norford, O 1-BSN 1994)
Road River 471.0 (250.0+)
?*Amplexograptus* sp.; *Glyptograptus* sp.
probably Middle Ordovician

5. GSC loc. C-124607 (B.S. Norford, O 1-BSN 1994)
Road River 621.0 (100.0+)
Amplexograptus sp.; *Glyptograptus* sp.
probably Middle Ordovician

6. GSC loc. C-124608 (B.S. Norford, O 1-BSN 1994)
Road River 720.0 (1.0+)
stromatoporoid; *Deiracorallium* sp.; *Catenipora* sp.; *Paleofavosites* sp.
Upper Ordovician, Ashgil, *Bighornia-Thaerodonta* Fauna

7. GSC loc. C-124609 (A. Pedder, DWM-171-AEHP-94)
Road River 721.0 (0.0+)
echinoderm debris; *Shanxipora* sp. cf. *S. luojiabaensis* Lin; encrusting fistuliporid bryozoan; serpulid worms
Almost certainly Middle or Upper Silurian, possibly Lower Devonian but likely no younger than *dehiscens* Zone age

Section 5 (MTA-82-17)

1. GSC loc. C-124592 (A. Pedder, DWM-134-AEHP-88)
Top of unnamed Silurian–Devonian Carbonates
Thamnopora sp.; *Lekanophyllum* sp.; *Gurievskiella* sp.; *Thoulelasma* sp.; *Fistilupora* sp.; *Gasterocoma*(?) *bicaula* Johnson and Lane
Lower Devonian, Emsian certainly, *serotinus* Zone likely

Section 53 (MTA-84-1)

1. GSC loc. C-128402 (T.T. Uyeno, 2-TTU-85)
Michelle 45.0+ (27.5)
Polygnathus dehiscens Philip and Jackson; *Steptotaxis? furnishi* (Klapper); *Panderodus* sp.
upper Lower Devonian, *dehiscens* Zone

2. GSC loc. C-128401 (A.W. Norris, 7-AWN-89)
Michelle 45.0+ (27.5)
Phragmostrophia sp.; *Desquamatia* n. sp. of Ludvigsen (1970); *Warrenella transversa* Ludvigsen and Perry, 1975; *Nowakia* sp.
lower Emsian, upper Lower Devonian

3. GSC loc. C-128420 (A. Pedder, DWM-134-AEHP-88)
Ogilvie 651.0 (92.0+)
bulbous stromatoporoids; *Alveolites* sp.; *Thamnopora* sp.; ambocoeliid brachiopod
Devonian, probably Emsian to Frasnian

4. GSC loc. C-128421 (A. Pedder, DWM-134-AEHP-88)
Ogilvie 682.5 (60.5+)
Pachyfavosites sp.; *Stringophyllum* sp.
Middle Devonian, Eifelian

5. GSC loc. C-128422 (A. Pedder, DWM-134-AEHP-88)
Ogilvie 729.0 (16.0+)
bulbous stromatoporoid; *Alveolites* sp.; *Syringopora* sp.
Middle Devonian, Eifelian

Section 50 (MTA-84-2)

1. GSC loc. C-128431 (B.S. Norford, O-D 1-BSN-1985)
Bouvette 400.0+ (5.0)
indeterminate rugose coral; *Catenipora* sp.
upper Middle Ordovician to Upper Silurian

2. GSC loc. C-128432 (A.W. Norris, 7-AWN-89)
Michelle 20.0 (85.0)
rugose coral, undet. frag.; *Gorgostrophia* sp. cf. *G. neutra* (Barrande) of Ludvigsen (1970); "*Strophochonetes*" *filistriata* (Walcott) of Ludvigsen (1970); *Warrenella* sp. cf. *W. transversa* Ludvigsen and Perry, 1975; planispiral gastropod, undet.; high-spired gastropod, undet.; *Lacunoporaspis norrisi* Ormiston, 1971; echinoderm ossicle (with single axial canal)
lower Emsian, upper Lower Devonian

3. GSC loc. C-128440 (A. Pedder, DWM-134-AEHP-88)
Ogilvie 61.5 (303.0+)
Gasterocoma(?) *bicaula* Johnson and Lane
Lower Devonian, Emsian, *dehiscens* Zone, to Middle Devonian, Eifelian, *costatus* Zone

4. GSC loc. C-128443 (A. Pedder, DWM-134-AEHP-88)
Ogilvie 264.5 (100.0+)
Favosites sp. undet.; *Gasterocoma*(?) *bicaula* Johnson and Lane
Lower Devonian, Emsian, *dehiscens* Zone, to Middle Devonian, Eifelian, *costatus* Zone

Section 48 (MTA-84-3)

1. GSC loc. C-128446 (A.W. Norris, 7-AWN-89)
Road River 1.0+ (113.0)
stromatoporoid; favositid coral; "*Strophochonetes*" *filistriata* (Walcott) of Ludvigsen (1970); dacryoconarid fragment; echinoderm ossicles (with single axial canal, one v. large)
lower Emsian, upper Lower Devonian

2. GSC loc. C-128449 (A.W. Norris, 7-AWN-89)
Michelle 30.0 (193.5)
cf. *Nervostrophia* sp.; *Phagmostrophia* sp. cf. *P. merriami* Harper, Johnson and Boucot; "*Strophochonetes*" *filistriata* (Walcott) of Ludvigsen (1970); *Desquamatia* n. sp. of Ludvigsen (1970); spirally coiled gastropod, undet.; echinoderm ossicle (with single axial canal); *Dechenella* (*Dechenella*) sp.; *Lacunoporaspis norrisi* Ormiston, 1971
lower Emsian, upper Lower Devonian

3. GSC loc. C-128451 (A.W. Norris, 7-AWN-89)
Michelle 166.5 (57.0)
Coenites sp.; *Favosites* sp.; *Receptaculites* sp.; *Cortezorthis* sp. cf. *C. cortezensis* Johnson and Talent; *Desquamatia* n. sp. of Ludvigsen,1970; cf. *Philoxene* sp.
lower Emsian, upper Lower Devonian

4. GSC loc. C-128450 (T.T. Uyeno, 2-TTU-85)
Michelle 166.5 (57.0)
Steptotaxis? furnishi (Klapper); *Panderodus* sp.
upper Lower Devonian, *dehiscens* Zone

5. GSC loc. C-128454 (T.T. Uyeno, 2-TTU-85)
Ogilvie 23.0 (252.0)
Pandorinellina exigua exigua (Philip); *P. exigua philipi* (Klapper)
upper Lower Devonian, *dehiscens* and *gronbergi* zones

6. GSC loc. C-128455 (A. Pedder, DWM-134-AEHP-88)
Ogilvie 45.0 (230.0+)
stromatoporoid, not studied; *Pseudamplexus* sp.; dechenellid pygidium, not studied; *Gasterocoma*(?) *bicaula* Johnson and Lane
Lower Devonian, Emsian, *dehiscens* or *gronbergi* Zone, probably the latter

7. GSC loc. C-128459 (T.T. Uyeno, 2-TTU-85)
Ogilvie 265.0 (10.0)
Polygnathus inversus Klapper and Johnson; *Panderodus* sp.
upper Lower Devonian, *inversus* to *serotinus* zones

Section 47 (MTA-84-4)

1. GSC loc. C-128469 (A.W. Norris, 7-AWN-89)
Road River 26.0+ (74.0)
Buchiola sp.; *Nowakia acuaria* (Richter); *Styliolina* sp.
Pragian, middle Lower Devonian

2. GSC loc. C-128470 (A.W. Norris, 7-AWN-89)
Road River 95.0+ (5.0)
fenestellid bryozoan; *Cortezorthis norfordi* Lenz, 1977; "*Strophochonetes*" *filistriata*; *Nowakia acuaria* (Richter) s.l.; *Dechenella* **(***Dechenella***)** sp.; *Leonaspis* **(***Kettneraspis***)** sp.; echinoderm ossicle (with single axial canal)
Pragian, middle Lower Devonian

Section 49 (MTA-84-5)

1. GSC loc. C-128471 (A.W. Norris, 7-AWN-89)
Michelle 95.0 (90.5)
alveolitid coral; *Coenites* sp.; frag. of large rugose coral; fenestellid bryozoan; *Phragmostrophia* sp.; *Desquamatia* n. sp. of Ludvigsen (1970) - fragment; tentaculitid frags (silicified); ostracode
Lower Devonian

2. GSC loc. C-128472 (T.T. Uyeno, 2-TTU-85)
Ogilvie 3.0 (297.5)
Polygnathus dehiscens Philip and Jackson; *Panderodus* sp.; *Pandorinellina exigua exigua* (Philip); *P***.** n. sp. O of Klapper and Johnson (1980)
upper Lower Devonian, *dehiscens* to *gronbergi* zones

3. GSC loc. C-128487 (T.T. Uyeno, 2-TTU-85)
Ogilvie 253.0 (48.0)
Polygnathus inversus Klapper and Johnson; *P. gronbergi* Klapper and Johnson; *Panderodus* sp.
upper Lower Devonian, *inversus* to *serotinus* zones (in view of its extremely poor preservation in contrast to others, the single specimen of *P. gronbergi* is considered a contaminant)

Section 51 (MTA-84-6)

1. GSC loc. C-128471 (A.W. Norris, 7-AWN-89)
Michelle 75.0 (57.0)
Coenites sp.; favositid coral (silicified); *Cortezorthis* sp. aff. *C. cortezensis* Johnson and Talent; "*Strophochonetes*" *filistriata* (Walcott) of Ludvigsen (1970); *Phragmostrophia* sp. cf. *P. merriami* Harper, Johnson and Boucot; *Desquamatia* n. sp. of Ludvigsen (1970); *Nowakia acuaria* (Richter); echinoderm ossicle (with single axial canal)
lower Emsian, upper Lower Devonian

2. GSC loc. C-128504 (T.T. Uyeno, 2-TTU-85)
Ogilvie 419.0 (0.0)
Pandorinellina expansa Uyeno and Mason; *Polygnathus* sp. (poss. *P. linguiformis* Hinde)
upper Lower Devonian to lower Middle Devonian, *inversus* to *costatus* zones

Section 52 (MTA-84-7)
1. GSC loc. C-128506 (A.W. Norris, 7-AWN-89)
Michelle 9.0 (55.5)
small cup coral; *Schizophoria* sp. cf. *S. nevadaensis* (Merriam) of Ludvigsen (1970); *Desquamatia* n. sp. of Ludvigsen (1970); *Warrenella* sp. cf. *W. transversa* Ludvigsen and Perry, 1975; *Styliolina* sp. cf. *S. fissurella* (Hall); *Nowakia acuria* (Richter); undet. small ostracode; *Dechellena* sp.
lower Emsian, upper Lower Devonian

2. GSC loc. C-128523 (T.T. Uyeno, 2-TTU-85)
Ogilvie 477.0 (+91.5)
Steptotaxis glenisteri (Klapper); *Polygnathus* cf. *P. linguiformis bultyncki* Weddige
upper Lower Devonian, *inversus* to *costatus* zones

3. GSC loc. C-128524 (A. Pedder, DWM-134-AEHP-88)
Ogilvie 477.0 (91.5)
Alveolites sp.; *Gasterocoma*(?) *bicaula* Johnson and Lane
Lower Devonian, Emsian, *dehiscens* Zone, to Middle Devonian, Eifelian, *costatus* Zone

Section 28 (MTA-84-8)

1. GSC loc. C-128526 (A.W. Norris, 7-AWN-89)
Michelle 13.0 (56.0)
small planispiral gastropod; small echinoderm ossicle with single axial canal; small, rectangular-shaped echinoderm ossicle with irregular-shaped axial canal; undet. trilobite head fragment
age undetermined

2. GSC loc. C-128534 (A. Pedder, DWM-134-AEHP-88)
Ogilvie 126.5 (311.0)
Gasterocoma(?) *bicaula* Johnson and Lane
Lower Devonian, Emsian, *dehiscens* Zone, to Middle Devonian, Eifelian, *costatus* Zone

3. GSC loc. C-128535 (A. Pedder, DWM-134-AEHP-88)
Ogilvie 252.0 (185.5)
Alveolites(?) sp.
Lower Devonian, late Emsian or Middle Devonian, Eifelian

4. GSC loc. C-128539 (A. Pedder, DWM-134-AEHP-88)
Ogilvie 427.5 (10.0)
stromatoporoids, not studied; *Thamnopora* sp.; *Alveolites* sp.
Lower Devonian, Pragian, *sulcatus* Zone, to Upper Devonian, Frasnian, *gigas* Zone

5. GSC loc. C-128540 (A. Pedder, DWM-134-AEHP-88)
Ogilvie 432.5 (5.0)
Alveolites sp.
Lower Devonian, Pragian, *sulcatus* Zone, to Upper Devonian, Frasnian, *gigas* Zone

Section 29 (MTA-84-9)

1.GSC loc. C-128546 (A. Pedder, DWM-134-AEHP-88)
Ogilvie 132.5 (81.0)
Alveolites sp.; *Exilifrons* sp. cf. *E. occidens* (Stumm); *Alleynia* sp.; solitary coral (unidentified); brachiopod valves (dissociated); *Gasterocoma*(?) *bicaula* Johnson and Lane
Lower Devonian, Emsian, *gronbergi* or *inversus* zone

Section 34 (MTA-84-10)

1. GSC loc. C-128459 (A.W. Norris, 7-AWN-89)
Michelle 5.0+ (5.0)
Gasterocoma(?) *bicaula* Johnson and Lane, 1969; echinoderm ossicle with single axial canal
Emsian to lowermost Eifelian

Section 3 (MTA-84-11)

1. GSC loc. C-128552 (A. Pedder, DWM-134-AEHP-88)
Ogilvie (map unit 10) 10.0+ (700.0)
Coenites sp.
Likely Upper Silurian (Ludlovian) to Lower Devonian (Lochkovian)

Section 6 (MTA-84-12)

1. GSC loc. C-124612 (B.S. Norford, O 1-BSN 1994)
Bouvette 423.0+ (10.0)
Catenipora cf. *C. robusta* (Wilson)
Upper Ordovician

2. GSC loc. C-124613 (B.S.Norford, C-D 5 BSN 1986 and A.W. Norris, 6-AWN-1986)
Road River 151.0 (365.0)
Nowakia sp. cf. *N. acuaria*; *Styliolina* sp.; *Monograptus yukonensis* Jackson and Lenz
acuaria Zone, Pragian, Lower Devonian

3. GSC loc. C-128559 (B.S. Norford, O-D 1-BSN-1985)
Road River 214.5 (301.5)
Monograptus spp.; *M.* ex. gr. *M. spiralis* (Geinitz); undetermined brachiopods; indeterminate trilobites; ?*Leonaspis* sp.
Lower Silurian, uppermost Llandovery, *spiralis* Zone

4. GSC loc. C-128562 (B.S. Norford and A.W. Norris, O-D 1-BSN-1985)
Road River 360.0 (156.0)
Monograptus yukonensis Jackson and Lenz; *Nowakia acuaria* (Richter); *Styliolina* sp.; cf. *Striatostyliolina* sp.
Lower Devonian, Pragian, *yukonensis* and *acuaria* zones

Section 2 (MTA-85-1)

1. GSC loc. C-137163 (T.T. Uyeno, 9-TTU-86)
Ogilvie 831.5+ (1.0)
Polygnathus linguiformis bultyncki Weddige; *P. serotinus* Telford
Lower to Middle Devonian, *serotinus* to *costatus* zones (upper Emsian to lower Eifelian)

Section 17 (MTA-85-2)

1. GSC loc. C-137166 (B.S. Norford, O-S 1 BSN 1986)
Road River 16.5 (687.5)
inarticulate and sowerbyellid brachiopods; ?*Ampyx* sp.; ?*Cybelurus* sp.; ?*Peraspis* sp.
probably lower Middle Ordovician

2. GSC loc. C-137167 (B.S. Norford, O-S 1 BSN 1986)
Road River 76.5 (627.5)
A: inarticulate brachiopod; ?*Climacograptus* sp.; *Dicellograptus* cf.; *D. bispiralis* Ruedemann; *Glyptograptus* sp.; *Leptograptus* cf. *L. flaccidus macer* Elles and Wood; ?*Orthograptus* sp.; retiolitid
Middle Ordovician, Caradoc, high *gracilis* Zone to *bicornis* Zone
B: *Glyptograptus* sp.; *Pterograptus* sp.; ?*Tylograptus* sp.
Middle Ordovician, probably Llanvirn

3. GSC loc. C-137168 (B.S. Norford, O-S 1 BSN 1986)
Road River 96.0 (608.0)
inarticulate brachiopod; *Amphiagraptus* sp.
?*Climacograptus* sp.; *Dicellograptus* cf. *D. bispiralis* (Ruedemann); *Glossograptus* sp.; *Glyptograptus* sp.; *Leptograptus* cf. *L. flaccidus macer* Elles and Wood; ?*Orthograptus* sp.
Middle Ordovician, Caradoc, high *gracilis* Zone to *bicornis* Zone

4. GSC loc. C-137169 (B.S. Norford, O-S 1 BSN 1986)
Road River 152.0 (552.0)
Climacograptus sp.; *Dicellograptus* sp.; *Orthograptus* ex gr. *O. calcaratus* (Lapworth)
Middle or Upper Ordovician

5. GSC loc. C-137171 (B.S. Norford, O-S 1 BSN 1986)
Road River 259.0 (445.0)
Climacograptus sp.; *Dicellograptus* sp.
Middle or Upper Ordovician

6. GSC loc. C-137172 (B.S. Norford, O-S 1 BSN 1986)
Road River 297.5 (406.5)
indeterminate brachiopods and trilobite; ?*Climacograptus* sp.; ?*Orthograptus* sp.
Middle or Upper Ordovician

7. GSC loc. C-137173 (B.S. Norford, O-S 1 BSN 1986)
Road River 315.0 (389.0)
indeterminate brachiopods and trilobite; ?*Climacograptus* sp.; *Dicellograptus* sp.; *Dicranograptus* sp.; *Glyptograptus* sp.
Middle Ordovician: high *gracilis* Zone to *truncatus intermedius* Zone

8. GSC loc. C-137174 (B.S. Norford, O-S 1 BSN 1986)
Road River 384.5 (319.5)
Climacograptus sp.; *Dicellograptus* sp.; ?*Orthograptus* sp.; *Glyptograptus* sp.
Middle or Late Ordovician

9. GSC loc. C-137175 (B.S. Norford, O-S 1 BSN 1986)
Road River 449.5 (254.5)
Climacograptus sp.
Middle Ordovician to Lower Devonian

10. GSC loc. C-137176 (B.S. Norford, O-S 1 BSN 1986)
Road River 549.0 (155.0)
Climacograptus sp.; *Dicellograptus* sp.; ?*Glyptograptus* sp.; *Orthograptus* cf. *O. truncatus strigosus* Ross and Berry
upper Middle Ordovician, Caradoc, *truncatus intermedius* Zone to *quadrimucronatus* Zone

11. GSC loc. C-137177 (B.S. Norford, O-S 1 BSN 1986)
Road River 595.5 (108.5)
Paleofavosites sp.
Upper Ordovician (Ashgill) to Upper Silurian

12. GSC loc. C-137178 (B.S. Norford, O-S 1 BSN 1986)
Road River 605.5 (98.5)
Climacograptus sp.; *C.* cf. *C. latus* Elles and Wood; *Dicellograptus* cf. *D. ornatus minor* Toghill; *Glyptograptus* sp.; ?*Orthograptus* sp.
Upper Ordovician, Ashgill, *ornatus* Zone

Section 38 (MTA-86-1)

1. GSC loc. C-149437 (A.W. Norris, 7-AWN-1987)
Michelle 50.0+ (94.0)
cf. *Megastrophia* sp.; *Desquamatia* sp.; *Nowakia acuaria* (Richter); *Viriatellina michellensis* Ludvigsen, 1972; *Gasterocoma*? *bicaula* Johnson and Lane, 1969; echinodern ossicle with single axial canal; five-sided echinoderm ossicle with single axial canal
Guerichina strangulata Zone (in conodont *dehiscens* Zone), lower Emsian, upper Lower Devonian

2. GSC loc. C-149438 (T.T. Uyeno, 10-TTU-87)
Michelle 144.0 (0.0)
Belodella sp.; *Eognathodus sulcatus kindlei* Lane and Ormiston; *Panderinellina exigua philipi* (Klapper); *Polygnathus pireneae* Boersma
middle Lower Devonian, *kindlei* to *dehiscens* zones

3. GSC loc. C-149445 (A.W. Norris, 7-AWN-1987)
Ogilvie 405.0 (519.0)
Desquamatia sp.; *Gasterocoma*? *bicaula* Johnson and Lane, 1969; echinoderm ossicle with single axial canal
upper Lower Devonian (Emsian) to lower Middle Devonian (lowermost Eifelian)

4. GSC loc. C-149447 (A. Pedder, DWM-134-AEHP-88)
Ogilvie 655.0 (269.0)
Thamnopora sp.; *Aulocystis* sp.; *Gasterocoma*(?) *bicaula* Johnson and Lane
Lower Devonian, Emsian, *dehiscens* Zone, to Middle Devonian, Eifelian, *costatus* Zone

5. GSC loc. C-149448 (A. Pedder, DWM-134-AEHP-88)
Ogilvie 819.0 (105.0)
Alveolites sp.
Lower Devonian, Pragian, *sulcatus* Zone, to Upper Devonian, Frasnian, *gigas* Zone

6. GSC loc. C-149449 (T.T. Uyeno, 10-TTU-87)
Ogilvie 924.0 (0.0)
Belodella sp.; *Panderodus*? sp.
Upper Silurian to Middle Devonian

Section 42 (MTA-86-2)

1. GSC loc. C-149453 (B.S. Norford, 05-BSN-1987)
Bouvette 639.0+ (342.0)
inarticulate brachiopod; ?*Climacograptus* sp.; *Glyptograptus* sp.; ?*Orthograptus* sp.; *Reteograptus* sp.; recrystallized ?stromatoporoids (separate block)
Middle or Upper Ordovician

2. GSC loc. C-149456 (A. Pedder, DWM-134-AEHP-88)
Bouvette 894.0+ (87.0)
Calapoecia sp.
Middle or Upper Ordovician

3. GSC loc. C-149459 (T.T. Uyeno, 10-TTU-87)
Michelle 87.0 (6.0)
Belodella sp.; *Ozarkodina*? sp. (small, juvenile?, Pa element); *Panderodus* sp.; *Pandorinellina exigua exigua* (Philip)
upper Lower Devonian, *dehiscens* to *serotinus* Zone

4. GSC loc. C-149465 (T.T. Uyeno, 10-TTU-87)
Ogilvie 232.0 (541.0)
Panderodus sp.; *Pandorinellina expansa* Uyeno and Mason
probable Lower Devonian to lower Middle Devonian, *inversus* to *costatus* zones

Section 15 (MTA-86-4)

1. GSC loc. C-151025 (A. Pedder, DWM-134-AEHP-88)
Bouvette 20.0+ (214.0)
Xystriphyllum sp. nov.
probable Lower Devonian, Lochkovian, *pesavis* Zone, to Emsian, *dehiscens* Zone

2. GSC loc. C-149481 (T.T. Uyeno, 10-TTU-87)
Ogilvie 118.0 (80.0+)
Panderodus sp.; *Pandorinellina expansa* Uyeno and Mason (Pa, Pb); *Steptotaxis glenisteri* (Klapper)
upper Lower Devonian, *inversus* to *serotinus* Zone

3. GSC loc. C-149480 (A. Pedder, DWM-134-AEHP-88)
Ogilvie 118.0 (80.0+)
stromatoporoids, unstudied; tabulate coral, unstudied; *Embolophyllum* sp. nov.; *Xystriphyllum mitchelli* (Etheridge); *Spongophyllum* sp. nov.; *Gasterocoma*(?) *bicaula* Johnson and Lane
Lower Devonian, Emsian, inversus or serotinus Zone

Section 39 (MTA-86-6)

1. GSC loc. C-149499 (A.W. Norris, 3-AWN-1987)
Ogilvie 465.0 (141.0)
large echinoderm ossicle with single axial canal; thick-shelled, tentaculitid fragment; cf. *Dechenella* (*Dechenella*) *maclareni* Ormiston
probably Eifelian, lower Middle Devonian

2. GSC loc. C-149500 (T.T. Uyeno, 10-TTU-87)
Ogilvie 523.0 (83.0)
Belodella sp.; *Dvorakia* sp.; *Panderodus*? sp.
Upper Silurian to Middle Devonian

Section 24 (MTA-86-7)

1. GSC loc. C-150755 (T.T. Uyeno, 10-TTU-87)
Michelle 122.0 (1.0)
Neopanderodus sp.; *Ozarkodina*? sp. (small indet. spathognathodontan element)
probably Lower to Middle Devonian

2. GSC loc. C-150758 (A.W. Norris, 3-AWN-1987)
Ogilvie 95.0 (145.0)
cf. *Moelleritia* sp.
probably Emsian, upper Lower Devonian

3. GSC loc. C-150759 (A.W. Norris, 3-AWN-1987)
Ogilvie 127.0 (113.0)
echinoderm ossicle with single axial canal; *Tentaculites* sp.; *Dechenella* (*Dechenella*) sp. cf. *D.* (*D.*) *bathurstensis* Ormiston
probably Eifelian, lower Middle Devonian

4. GSC loc. C-150760 (T.T. Uyeno, 10-TTU-87)
Ogilvie 140.0 (100.0)
Belodella sp.; *Panderodus* sp.; *Pandorinellina expansa* Uyeno and Mason; *Steptotaxis glenisteri* (Klapper)
upper Lower Devonian, *inversus* to *serotinus* zones

Section 12 (MTA-86-8)

1. GSC loc. C-150766 (A.W. Norris, 7-AWN-1987)
Road River 113.0+ (130.0)
cf. *Nowakia zlichovensis* Bouček; *Viriatella* sp.; undet. costate pelecypod impressions
N. zlichovensis Zone, aligned approximately with conodont upper *dehiscens* Zone, lower Emsian, upper Lower Devonian

Section 37 (MTA-86-9)

1. GSC loc. C-150769 (T.T. Uyeno, 10-TTU-87)
Michelle 20.0 (37.0)
Belodella sp.; *Panderodus* sp.; Pandorinellina exigua exigua (Philip); *Pandorinellina steinhornensis miae* (Bultynck); *Pedavis* cf. *P. sherryae* Lane and Ormiston; *Polygnathus dehiscens* Philip and Jackson
upper Lower Devonian, *dehiscens* Zone

2. GSC loc. C-149780 (A. Pedder, DWM-134-AEHP-88)
Ogilvie 319.0 (414.0)
Xystriphyllum mitchelli (Etheridge)
Lower Devonian, Emsian, *inversus* or *serotinus* Zone

3. GSC loc. C-150781 (A.W. Norris, 3-AWN-1987)
Ogilvie 341.0 (385.0)
cf. *Otarion* sp.
probably Emsian, upper Lower Devonian

4. GSC loc. C-150788 (T.T. Uyeno, 10-TTU-87)
Ogilvie 691.0 (42.0)
Dapsilodus cf. *D. obliquicostatus* (Branson and Mehl); *Decoriconus* cf. *D. fragilis* (Branson and Mehl); *Panderodus* sp.
probably upper Lower to Upper Silurian

Section 36 (MTA-86-11)

1. GSC loc. C-150798 (B.S. Norford, 05-BSN-1987)
Road River 45.0 (72.0)
sponge spicules; biserial graptolite; *Dicellograptus* sp.; ?*Leptograptus* sp.
Middle or Upper Ordovician (probably Middle)

2. GSC loc. C-150804 (T.T. Uyeno, 10-TTU-87)
Ogilvie 91.0 (357.0)
Pandorinellina? sp. (may be assignable to *P. expansa* Uyeno and Mason); indet. fragments
possibly upper Lower to lower Middle Devonian

3. GSC loc. C-150808 (T.T. Uyeno, 10-TTU-87)
Ogilvie 420.0 (28.0)
Dvorakia sp.; *Neopanderodus* sp.; *Panderodus* sp.; *Polygnathus* cf. *P. curtigladius* Uyeno; *P. linguiformis linguiformis* Hinde (morphotype with extremely abbreviated tongue); *P. linguiformis* Hinde transitional to *P. parawebbi* Chatterton
Middle Devonian, possibly mid-Eifelian (about *australis* to *kockelianus* zones)

4. GSC loc. C-150809 (A.W. Norris, 7-AWN-1987)
Ogilvie 420.0 (28.0)
Carinagypa sp. of Perry et al. 1974
through Emsian to lower Eifelian, upper Lower to Middle Devonian

Section 25 (MTA-86-12)

1. GSC loc. C-150816 (G.S. Nowlan, 002-GSN-88)
Road River 4.0 (50.0)
Belodina confluens Sweet; *Belodina stonei* Sweet; *Coelocerodontus* sp.; *Drepanoistodus suberectus* (Branson and Mehl); *Decoriconus costulatus* (Rexroad); *Ozarkodina sequipedalis* Nowlan and McCracken; *Panderodus bergstroemi* Sweet; *Panderodus gracilus* (Branson and Mehl); *Paroistodus*? *mutatus* (Branson and Mehl); *Protopanderodus insculptus* (Branson and Mehl); *Pseudooneotodus mitratus mitratus* (Moskalenko); *Pseudobelodina dispansa* (Glenister); *Scabbadella altipes* (Henningsmoen); *Zanclodus levigatus* Nowlan and McCracken; zygognathiform element indet.
Upper Ordovician (Richmondian?)

2. GSC loc. C-150821 (T.T. Uyeno, 10-TTU-87)
Ogilvie 89.0 (25.0)
Panderodus sp.; *Pandorellina* cf. *P. expansa* Uyeno and Mason; *Polygnathus linguiformis* subspecies indet.
the basal cavity of *P. linguiformis* suggests that it may be an early form of *P.l. linguiformis* Hinde. If this is correct, then the age is about the *costatus* Zone, early Eifelian, lower Middle Devonian

3. GSC loc. C-150822 (A. Pedder, DWM-125-AEHP-87)
Ogilvie 110.0 (4.0+)
Spongonaria ogilviensis Crickmay; *Paracyclas* sp. (genus broadly interpreted), large form; *Gasterocoma*(?) *bicaula* Johnson and Lane
Lower Devonian, Emsian, *gronbergi* to *serotinus* Zone

4. GSC loc. C-150822 (A.W. Norris, 7-AWN-1987)
Ogilvie 110.0 (4.0+)
colonial coral - to A.E.H. Pedder; cf. *Paracyclas* sp. - unusually large form; undet. recrystallized nowakiid fragments; *Gasterocoma*? *bicaula* Johnson and Lane, 1969; echinoderm ossicle with "cross-like" axial canal; echinoderm ossicle with single axial canal
upper *dehiscens* to *costatus* Zone, Emsian of upper Lower Devonian to lower Eifelian of lower Middle Devonian

Section 40 (MTA-86-13)

1. GSC loc. C-150824 (B.S. Norford, 05-BSN-1987)
Road River 45.0+ (81.0)
?*Climacograptus* sp.; *Orthograptus* sp.; *Dicellograptus* sp.; *Robergia* sp.
Middle Ordovician

2. GSC loc. C-150826 (T.T. Uyeno, 10-TTU-87)
Ogilvie 60.0 (617.0)
Pb (ozarkodiniform) element, perhaps of *Pandorinellina* sp.
probably Devonian

3. GSC loc. C-150832 (G.S. Nowlan, 002-GSN-1988)
Ogilvie 667.0 (10.0)
Paroistodus? *mutatus* (Branson and Mehl); denticulate fragments
Middle to Upper Ordovician [reworked]

Section 43 (MTA-86-14)

1. GSC loc. C-150838 (A. Pedder, DWM-134-AEHP-88)
Ogilvie 541.0 (185.0)
stromatoporoid, bulbous; spiral "worm" tubes; *Alveolites* sp. undet.
Lower Devonian, Pragian, *sulcatus* Zone, to Upper Devonian, Frasnian, *gigas* Zone

2. GSC loc. C-150839 (T.T. Uyeno, 10-TTU-87)
Ogilvie 721.0 (5.0)
Belodella sp.; *Neopanderodus* sp.; *Panderodus* sp.; *Polygnathus linguiformis linguiformis* Hinde
Middle Devonian

Section 55 (MTA-86-16)

1. GSC loc. C-150908 (G.S. Nowlan, 002-GSN-88)
Bouvette 912.0 (30.0)
Panderodus gracilis (Branson and Mehl); *Protopanderodus* sp.
Middle to Upper Ordovician

2. GSC loc. C-150905 (A.W. Norris, 3-AWN-1987)
Mount Dewdney 10.0 (30.0)
Moelleritia sp. - fragments; undet. small, smooth ostracodes
probably Lower Devonian

3. GSC loc. C-150906 (T.T. Uyeno, 10-TTU-86)
Mount Dewdney 40.0 (0.0)
Panderodus sp.; *Pandorinellina expansa* Uyeno and Mason; *Polygnathus* cf. *P. inversus* Klapper and Johnson (2 fragments - small specimens); *Steptotaxis* cf. *S. glenisteri* (Klapper)
Lower Devonian, probably *inversus* Zone

Section 56 (MTA-86-17)

1. GSC loc. C-150914 (G.S. Nowlan, 002-GSN-88)
Mount Dewdney 4.0 (77.0)
Panderodus sp.; acodotiform element indet.; oistodontiform element indet.
Middle to Upper Ordovician

2. GSC loc. C-150916 (A.W. Norris, 7-AWN-1987)
Ogilvie 106.0 (752.0)
alveolitid coral, poorly preserved; *Spinatrypa* sp.; cf. *Carinatrypa* sp.; cf. *Nucleospira* sp.
possibly Upper Eifelian, lower Middle Devonian

Section 31 (MTA-86-19)

1. GSC loc. C-150927 (T.T. Uyeno, 10-TTU-87)
Ogilvie 30.0 (574.0)

Eognathodus sulcatus kindlei Lane and Ormiston; *Panderodus* sp.
middle to upper Lower Devonian, *kindlei* to *dehiscens* zones

2. GSC loc. C-150938 (A.W. Norris, 3-AWN-1987)
Ogilvie 472.0 (132.0)
fish bone fragment; undet. ostracode; age not determined

3. GSC loc. C-150937 (A. Pedder, DWM-134-AEHP-88)
Ogilvie 473.0 (131.0)
Leurelasma sp. nov.
Lower Devonian, Emsian, *dehiscens* Zone, to Middle Devonian, Eifelian, *costatus* Zone

4. GSC loc. C-150936 (A. Pedder, DWM-134-AEHP-88)
Ogilvie 478.0 (126.0)
Natalophyllum sp. undet.
Lower or Middle Devonian, but likely Eifelian, *costatus* Zone

5. GSC loc. C-150941 (T.T. Uyeno, 10-TTU-87)
Ogilvie 604.0 (0.0)
Panderodus sp.; *Polygnathus* sp. (small frag. Pa element)
upper Lower to Middle Devonian

Section 20 (MTA-86-21)

1. GSC loc. C-150952 (T.T. Uyeno, 10-TTU-87)
Road River 108.0 (187.0)
Icriodus taimyricus Kuzmin; *Panderodus* sp.; *Pandorinellina* sp.; *Polygnathus dehiscens* Philip and Jackson
upper Lower Devonian, *dehiscens* Zone

2. GSC loc. C-150954 (A.W. Norris, 7-AWN-1987)
Road River 167.0+ (128.0)
Nowakia acuaria (Richter) s.l.; *Styliolina* sp.
N. acuaria Zone, upper Lochkovian through most of Pragian, Lower Devonian

Section 33 (MTA-86-22)

1. GSC loc. C-150963 (A.W. Norris, 7-AWN-1987)
Ogilvie 257.0+ (108.0)
cf. *Muriferella* sp.; *Carinagypa* sp. of Perry et al., 1974; cf. *Trigonirhynchia* sp.
probably Emsian, upper Lower Devonian

2. GSC loc. C-150965 (A.W. Norris, 7-AWN-1987)
Ogilvie 305.0+ (60.0)
Carinagypa sp. of Perry et al., 1974; *Gasterocoma*? *bicaula* Johnson and Lane, 1969; echinoderm ossicle with "cross-like" axial canal; five-sided echinoderm ossicle with single axial canal; echinoderm ossicle with single axial canal
Emsian to lower Eifelian, upper Lower to lower Middle Devonian

3. GSC loc. C-150967 (A.W. Norris, 3-AWN-1987)
Ogilvie 345.0+ (20.0)
Desquamatia sp. - fragment; *Spinatrypa* sp.; *Gasterocoma*(?) *bicaula* Johnson and Lane; echinoderm ossicle with single axial canal; echinoderm ossicle with single axial and four peripheral canals; *Tentaculites* sp.; undet. sml., smooth ostracode; *Dechenella* (Dechenella) sp. cf. *D. (D.) tesca* Ormiston
Emsian, upper Lower Devonian

Section 7 (MTA-86-25)

1. GSC loc. C-150981 (B.S. Norford, 05-BSN-1987)
Road River 10.0+ (10.0)
inarticulate brachiopod; ?*Climacograptus* sp.; *Dicellograptus* sp.; ?*Orthograptus* sp.; *Pseudoclimacograptus* sp.
Middle or Upper Ordovician, possibly *gracilis* Zone or *bicornis* Zone

Section 54 (MTA-86-26)

1. GSC loc. C-150982 (B.S. Norford, 05-BSN-1987)
Road River 26.0 (89.0)
inarticulate and orthid brachiopods; *Amplexograptus* sp.; ?*Climacograptus* sp.; *Cryptograptus* sp.
Middle or Upper Ordovician

2. GSC loc. C-150983 (G.S. Nowlan, 002-GSN-88)
Road River 27.0 (88.0)
Coelocerodontus trigonius Ethington; *Drepanoistodus* sp.; *Ozarkodina sequipedalis* (Branson and Mehl); *Panderodus gracilis* (Branson and Mehl); *Paroistodus*? *mutatus* (Branson and Mehl); *Protopanderodus* sp.; *Scabbardella altipes* (Henningsmoen)
Upper Ordovician (Richmondian)

3. GSC loc. C-150984 (B.S. Norford, 05-BSN-1987)
Road River 35.0 (80.0)
Amplexograptus sp.
Middle to Upper Ordovician

4. GSC loc. C-150985 (B.S. Norford, 05-BSN-1987)
Road River 61.0 (54.0)
Amplexograptus sp.; ?*Climacograptus* sp.
Middle to Upper Ordovician

5. GSC loc. C-150987 (T.T. Uyeno, 10-TTU-87)
Ogilvie 17.0 (184.0)
Dvorakia sp.; *Ozarkodina brevis* (Bischoff and Ziegler); *O.* cf. *O. raaschi* Klapper and Barrick; *Panderodus* sp.; *Polygnathus linguiformis linguiformis* Hinde
Middle Devonian, probably upper Eifelian

6. GSC loc. C-150988 (T.T. Uyeno, 10-TTU-87)
Ogilvie 96.0 (105.0)
Belodella sp.; *Dvorakia* sp.; *Panderodus* sp.
Upper Silurian to Middle Devonian

Section 26 (MTA-86-P2)

1. GSC loc. C-151019 (T.T. Uyeno, 10-TTU-87)
Ogilvie 85.0 (25.0)
Belodella sp.; *Panderodus* sp.; *Pandorinellina* sp.; *Polygnathus linguiformis bultyncki* Weddige; *Polygnathus serotinus* Telford
upper Lower to lower Middle Devonian, *serotinus* to *costatus* zones

Section MTA-88-2

1. GSC loc. C-124630 (B. Norford, C-S 2-BSN-1988)
Vunta 222.5+ (354.0)
echinoderm, trilobite and ostracode fargments; solitary coral; *Cystihalysites* sp.; *Favosites* sp.; *Paleofavosites* sp.
Silurian, probably Lower Silurian

2. GSC loc. C-124632 (B. Norford, C-S 2-BSN-1988)
Vunta 330.5+ (246.0)
echinoderm debris; large brachiopod; gastropod fragments; ?*Raphistoma* sp.
Middle Ordovician to Silurian

Section MTA-88-3

1. GSC loc. C-124646 (A. Pedder, DWM-132-AEHP-88)
Ogilvie 667.0 (1.0)
Stachyodes(?) sp. undet.; stromatoporoid, indeterminate; *Thamnopora*(?) sp. undet.
Devonian

2. GSC loc. C-124649 (E. Bamber, C5-EWB-1988)
Lisburne Gp 30.0 (2.0)
bothrophyllid coral
Upper Carboniferous or Lower Permian, probably upper Moscovian

Section MTA-88-4

1. GSC loc. C-151034 (B. Norford, C-S 2-BSN-1988)
C_1 map unit (D.K. Norris, 1981) 293.0+ (13.0)
Olenellus sp.
uppermost Lower Cambrian, *Bonnia–Olenellus* Zone

Section Stn 86-P5*

1. GSC loc. C-151021 (T.T. Uyeno, 10-TTU-87)
Ogilvie 0.0
Polygnathus parawebbi Chatterton; indet. simple cones
Middle Devonian, *australis* Zone to Lower *varcus* Subzone

2. GSC loc. C-151023 (T.T. Uyeno, 10-TTU-87)
Ogilvie (0.0)
Belodella? sp.; *Ozarkodina*? sp. (small spathognathodontan element); *Panderodus* sp.
Upper Ordovician to Middle Devonian

*These entries are for spot localities at the base and top of a thin Ogilvie section exposed at this locality or station. Stn 86-P5 is in the Ogilvie River map area (116G and F, E1/2) at 65°54'45" latitude and 139°14'00" longitude

Part 2: Biostratigraphic determinations from subsurface well sections

I.N.C. Attoe Lake I-06 (A.E.H. Pedder in Norford et al., 1973)

1. GSC locs. C-12642 and C-12643
Hume 3,836-3,837 ft. 189-190 (81-82) [57.6-57.9 (24.7-25.0)]**
Syringopora sp. indet.; *Sociophyllum glomeratum* (Crickmay)
Middle Devonian, Eifelian, *dysmorphostrota* Zone

2. GSC loc. C-12644
Hume 3,902 ft. 124 (147) [37.8 (44.8)]
Pachyfavosites sp. indet.
Upper Silurian (Ludlovian) to Middle Devonian

3. GSC loc. C-12645
Arnica 5,270 ft. 398 (290) [121.3 (88.4)]
?*Squameofavosites* sp.
probably Lower Devonian

Peel Plateau Eagle Plain YT No. 1 N-49 (B.S. Norford in Norford et al., 1973)

1. GSC loc. C-18050
Bouvette Formation 7,061 ft. 2,528+ (535) [770.5+ (163.1)]
?*Favosites* sp.; *Syringopora* sp.
Silurian to Devonian

2. GSC locs. C-18051 and C-69291
Bouvette 7,337-7,377 ft. 2,252+-2212+ (811-851) [686.4+-674.2+ (247.2-259.4)]
undetermined brachiopods; *Favosites* sp.; *Aulacopleura* sp.
probably upper Llandovery (Lower Silurian)

3. GSC locs. C-18056 to C-18059
Bouvette 7,891-7,898 ft. 1698+-1691+ (1365-1372) [517.6+-515.4+ (416.1-418.2)]
stromatoporoid(?); *Bighornia* sp.; ?*Lobocorallium* sp.; *Paleophyllum* sp.; *Catenipora* sp.; *Paleofavosites* sp.
Upper Ordovician, Ashgill

Socony Mobil-W.M. N. Cathedral YT B-62 (B.S. Norford in Norford et al., 1971)

1. GSC locs. C-9989 and C-9990
Road River 6,037.5-6,039 ft. 150.5-149 (330.5-332) [45.9-45.4 (100.7-101.2)]
echinoderm debris; solitary coral; *Favosites* sp.; *Heliolites* sp.
Silurian to Middle Devonian

2. GSC loc. C-9991
Road River 6,040 ft. 148 (333) [45.1 (101.5)]
Cyrtograptus cf. *C. lundgreni* Tullberg; *Monograptus* aff. *M. flemingi* (Salter)
Silurian, Wenlock

I.O.E. Stoney I-50 (B.S. Norford in Norford et al., 1971)

1. GSC locs. C-1459 and C-1466
Mount Kindle 8,944-8,962 ft. 878-860 (64-82) [267.6-262.1 (19.5-25.0)]
echinoderm debris; indeterminate ostracode and solitary coral; *Catenipora* sp.; *Favosites* sp.; pentamerid brachiopod
Silurian

Socony Mobil-WM South Tuttle YT N-05 (B.S. Norford in Norford et al., 1971)

1. GSC locs. C-10010 and C-10011
Ogilvie 8,339-8,340 ft. 211-210 (3,616-3,617) [64.3-64.0 (1,102.2-1,102.5)]
indeterminate ostracodes; ?*Atrypella* sp.
probably Upper Silurian, Ludlow

2. GSC locs. C-10012 and C-10013
Road River 8,897.5-8,898 ft. 514.5-514 (144.5-145) [156.8-156.7 (44.0-44.2)]
indeterminate gastropods and straight cephalopod; ?*Alispira* sp.; ?*Pentameroides* sp.; *Encrinurus* cf. *E. princeps* Poulsen
Silurian, probably upper Llandovery

3. GSC locs. C-10014 and GSC C-10015
Bouvette 9,523-9,530.5 ft. 2,004+-1996.5+ (111-118.5) [610.8-608.5 (33.8-36.1)]
echinoderm debris; *Bighornia* sp.; *Palaeophyllum* sp.; *Catenipora* sp.; *Paleofavosites* sp.
Upper Ordovician, Ashgill

S.O.B.C. Blackstone YT D-77 (B.S. Norford in Norford et al., 1971)

1. GSC loc. C-2930
Bouvette 9,305 ft. 3912+ (29) [1192.4+ (8.8)]
Bighornia sp.
Upper Ordovician, Ashgill

2. GSC loc. C-2931
Bouvette 9,310.5 ft. 3906.5+ (34.5) [1190.7+ (10.5)]
indeterminate brachiopods; *Megamyonia* sp.
Upper Ordovician, Ashgill

3. GSC locs. C-2934 and C-2935
Bouvette 9,323.5-9,324.5 ft. 3893.5+-3892.5+ (47.5-48.5) [1,186.8+-1,186.5+ (14.5-14.8)]
undetermined stromatoporoid; *Palaeophyllum* sp.
probably Upper Ordovician

4. GSC locs. C-2938 and C-2939
Bouvette 9,330-9,335.5 ft. 3,887+-3,881.5+ (54-59.5) [1,184.8+-1,183.1+ (16.5-18.1)]
echinoderm debris; undetermined stromatoporoid; *Bighornia* sp.; *Catenipora* sp.
Upper Ordovician, Ashgill

**The name of the stratigraphic unit for each occurrence is followed by the interval depth below the kelly bushing. This is followed by the height in feet above the base, and, in brackets, the depth below the top of the stratigraphic unit. After this, enclosed in square brackets, is the same height and depth relative to the base and top of the enclosing unit in metres.

Appendix 7
Columnar sections

LEGEND

Limestone shaly limestone

Dolostone

Shale (so t commonly calcareous)

Sedimentary reccia

Silty and sandy dolostone

Mudstone

Shale (hard commonly siliceous)

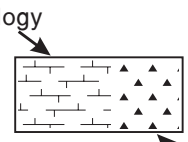
Siltstone

Sandstone and shale

Chert

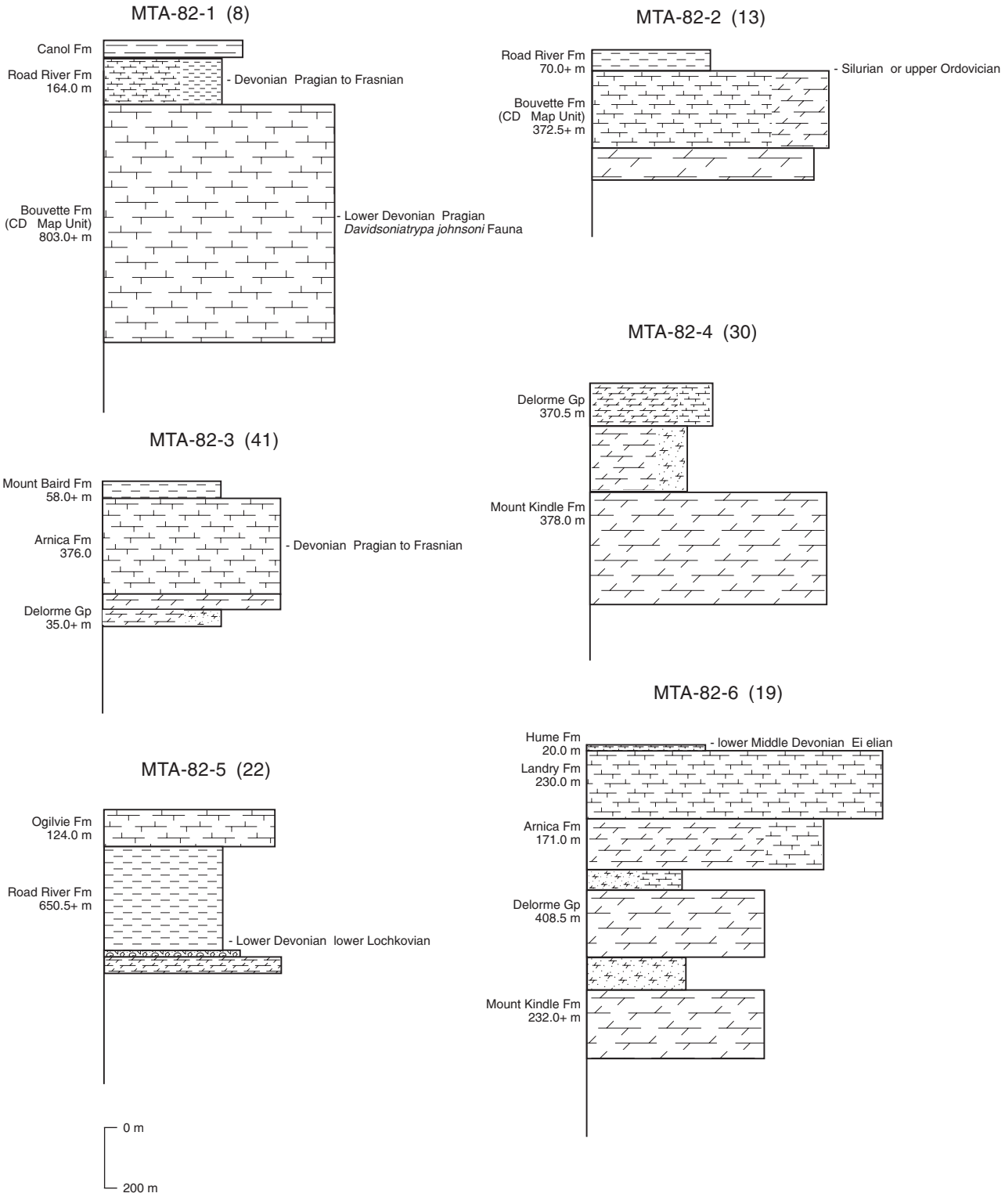
Sandy conglomerate

Metamorphosed siltstone

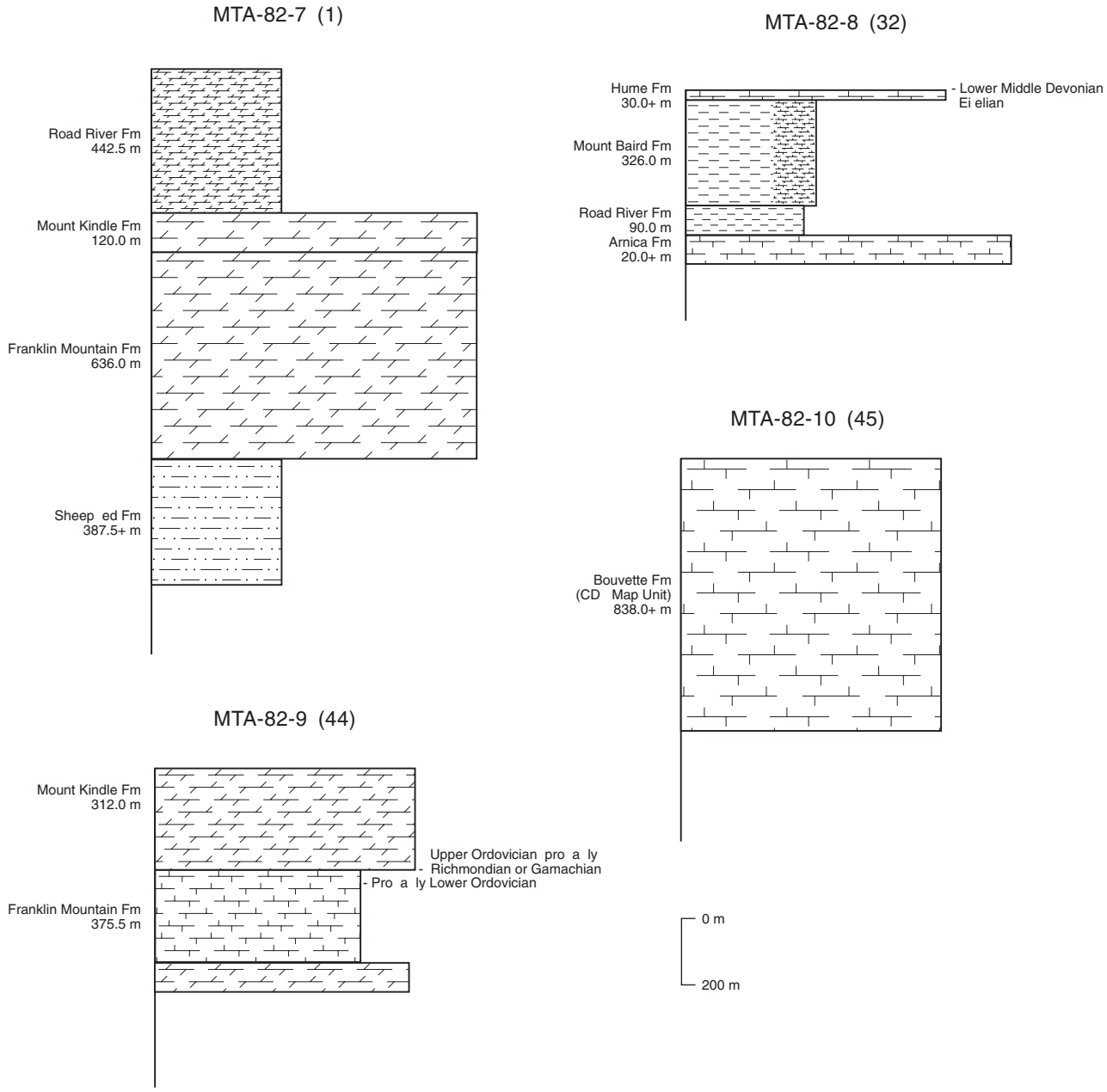
Stratigraphic unit 

Coarseness o lithological pattern is proportional to the thickness o edding. Thinner edded limestones also tend to e argillaceous or even shaly in the Road River Formation.

Columnar sections (A)
Stratigrap ic Sections MTA-82-1 to MTA-82-6

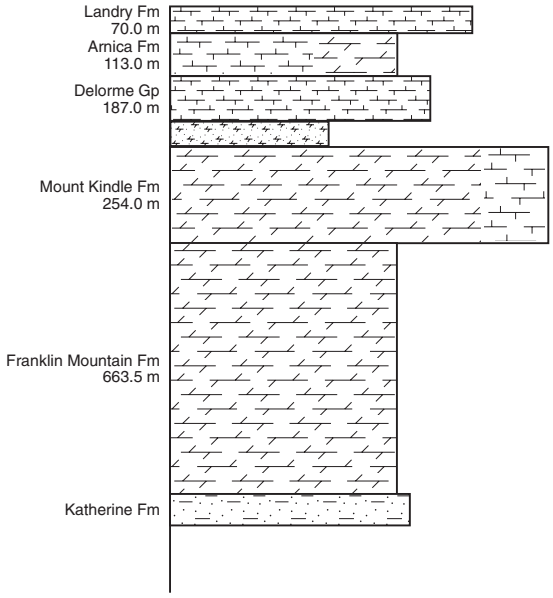


Columnar sections (B)
Stratigraphic Sections MTA-82-7 to MTA-82-10

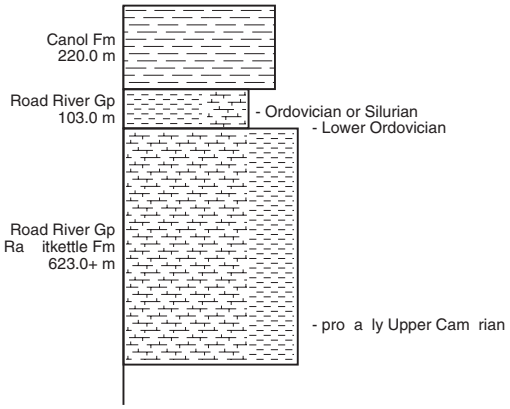


Columnar sections (C)
Stratigraphic Sections MTA-82-11 to MTA-82-16

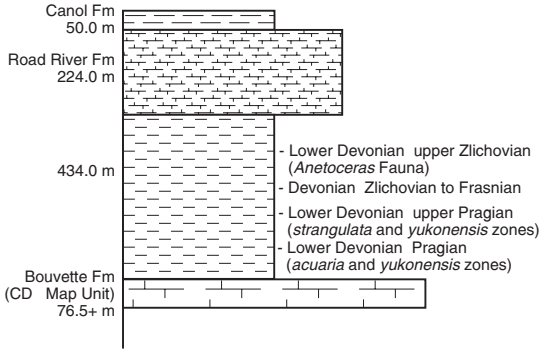
MTA-82-11 (27)



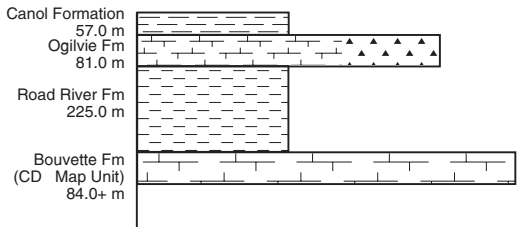
MTA-82-12 (57)



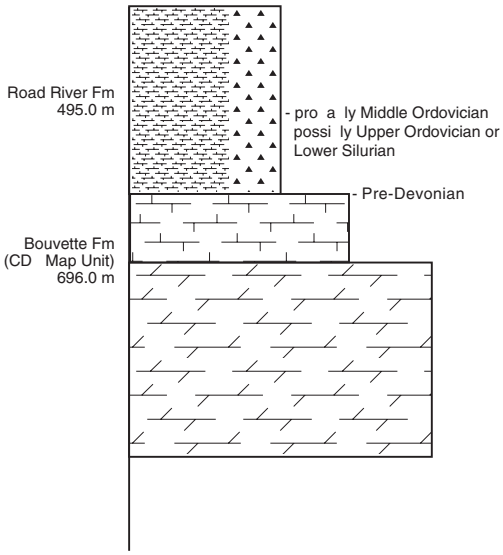
MTA-82-13 (9)



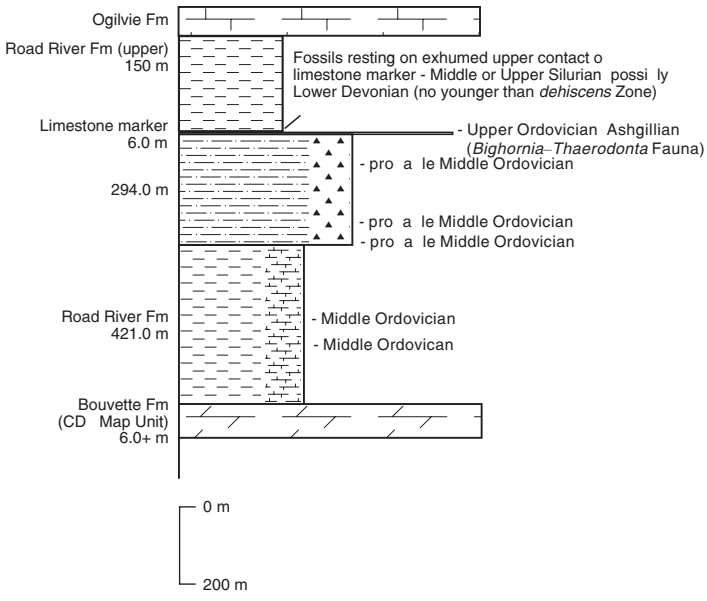
MTA-82-14 (23)



MTA-82-15 (16)

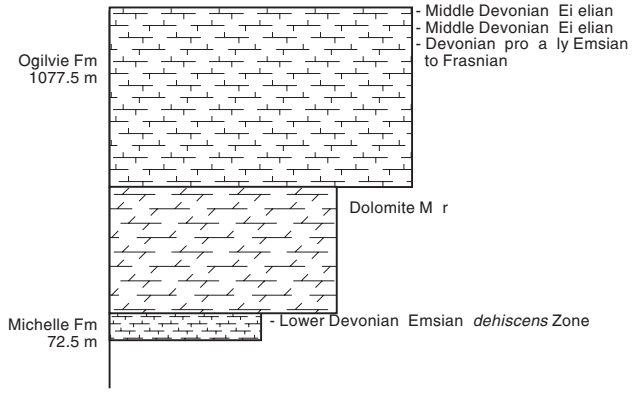


MTA-82-16 (14)

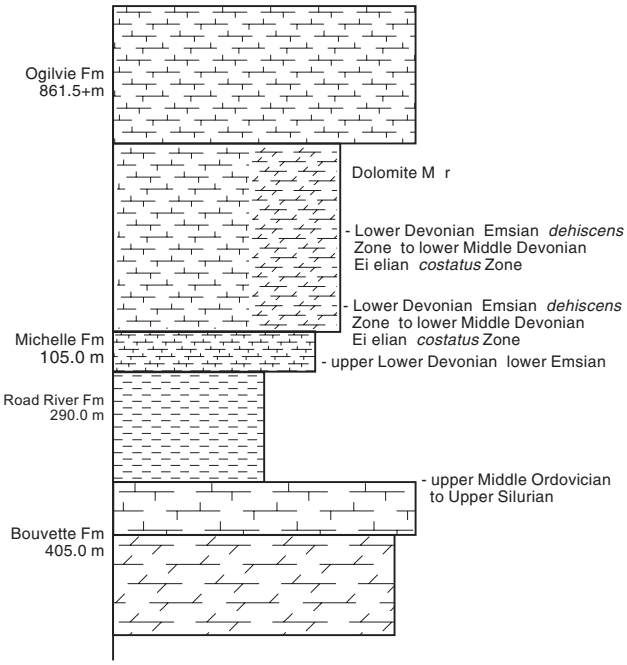


Columnar sections (D)
Stratigraphic Sections MTA-84-1 to MTA-84-6

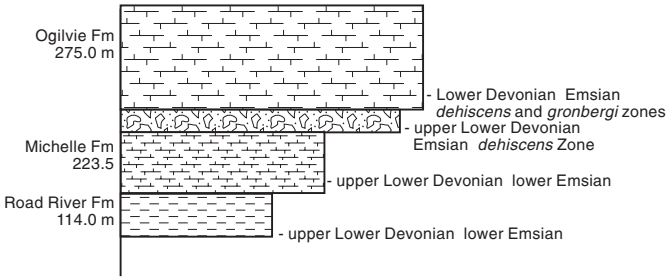
MTA-84-1 (53)



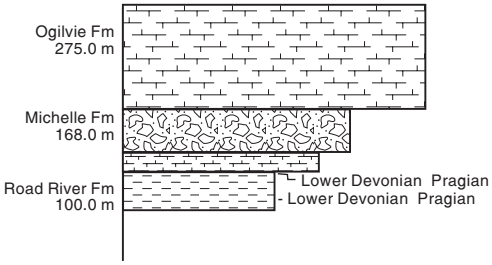
MTA-84-2 (50)



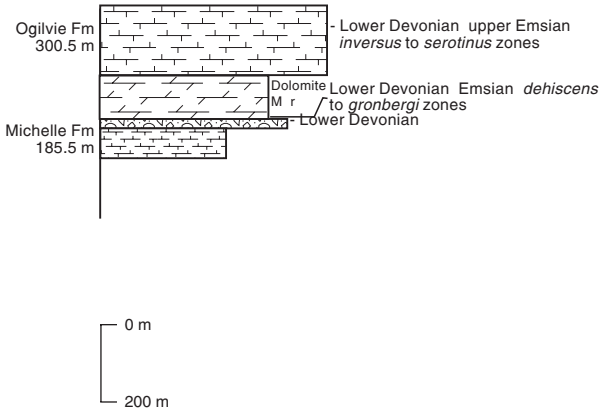
MTA-84-3 (48)



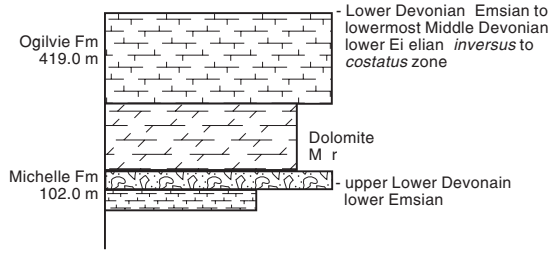
MTA-84-4 (47)



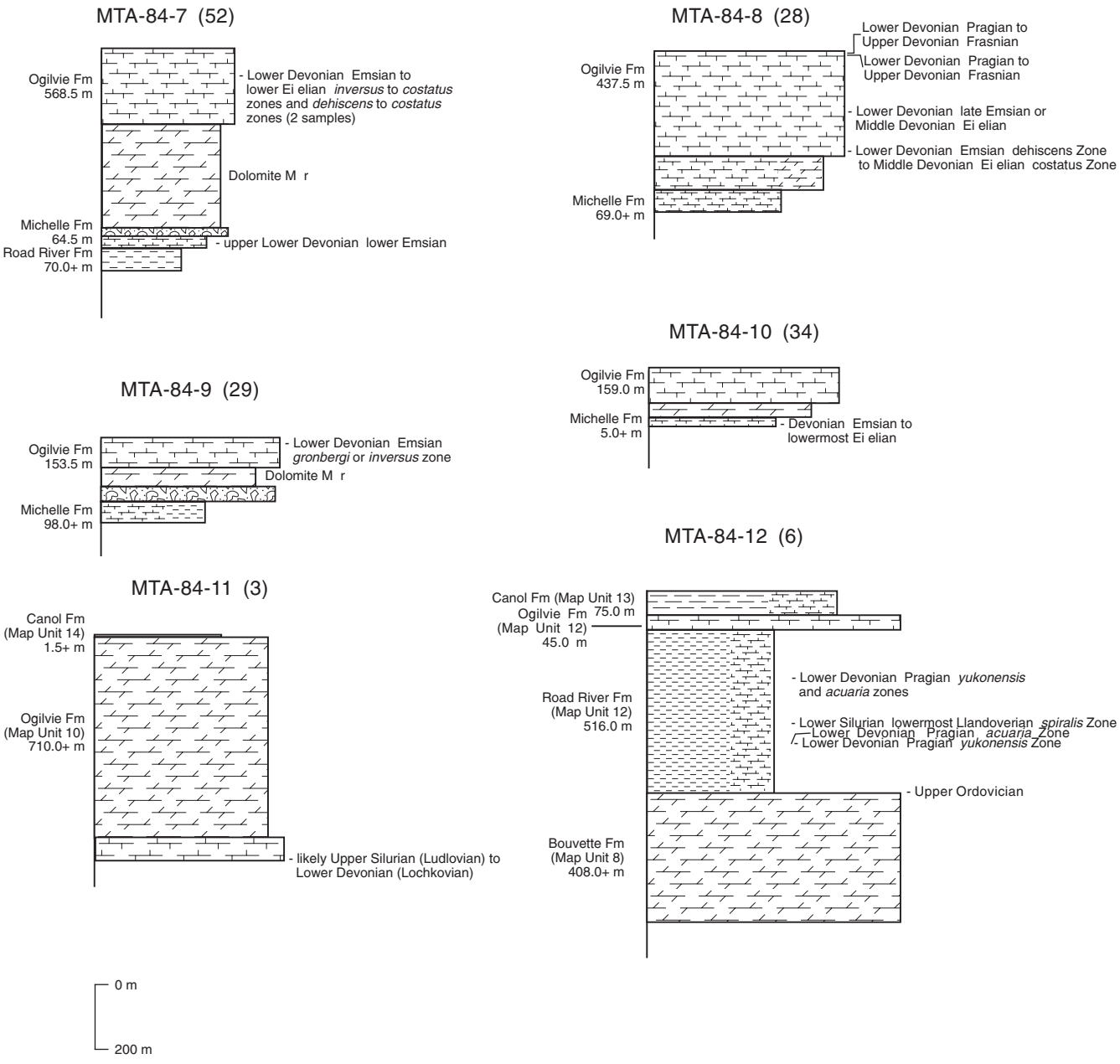
MTA-84-5 (49)



MTA-84-6 (51)

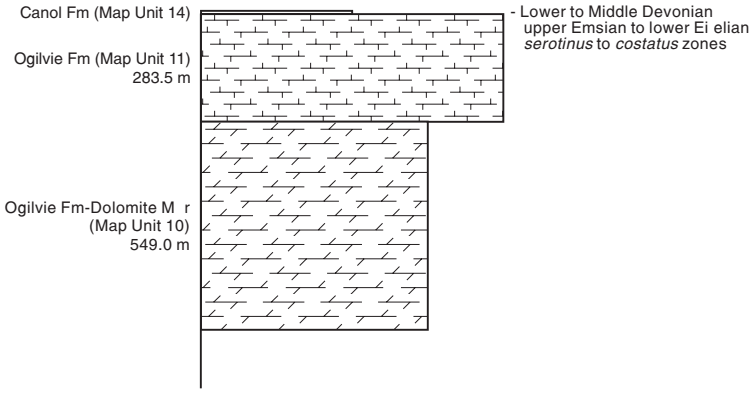


Columnar sections (E)
Stratigraphic Sections MTA-84-7 to MTA-84-12

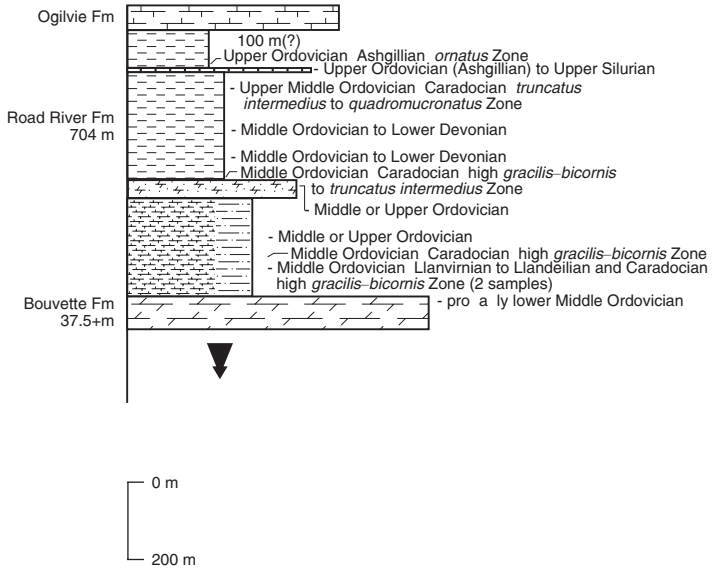


Columnar sections (F)
Stratigrap ic Sections MTA-85-1 and MTA-85-2

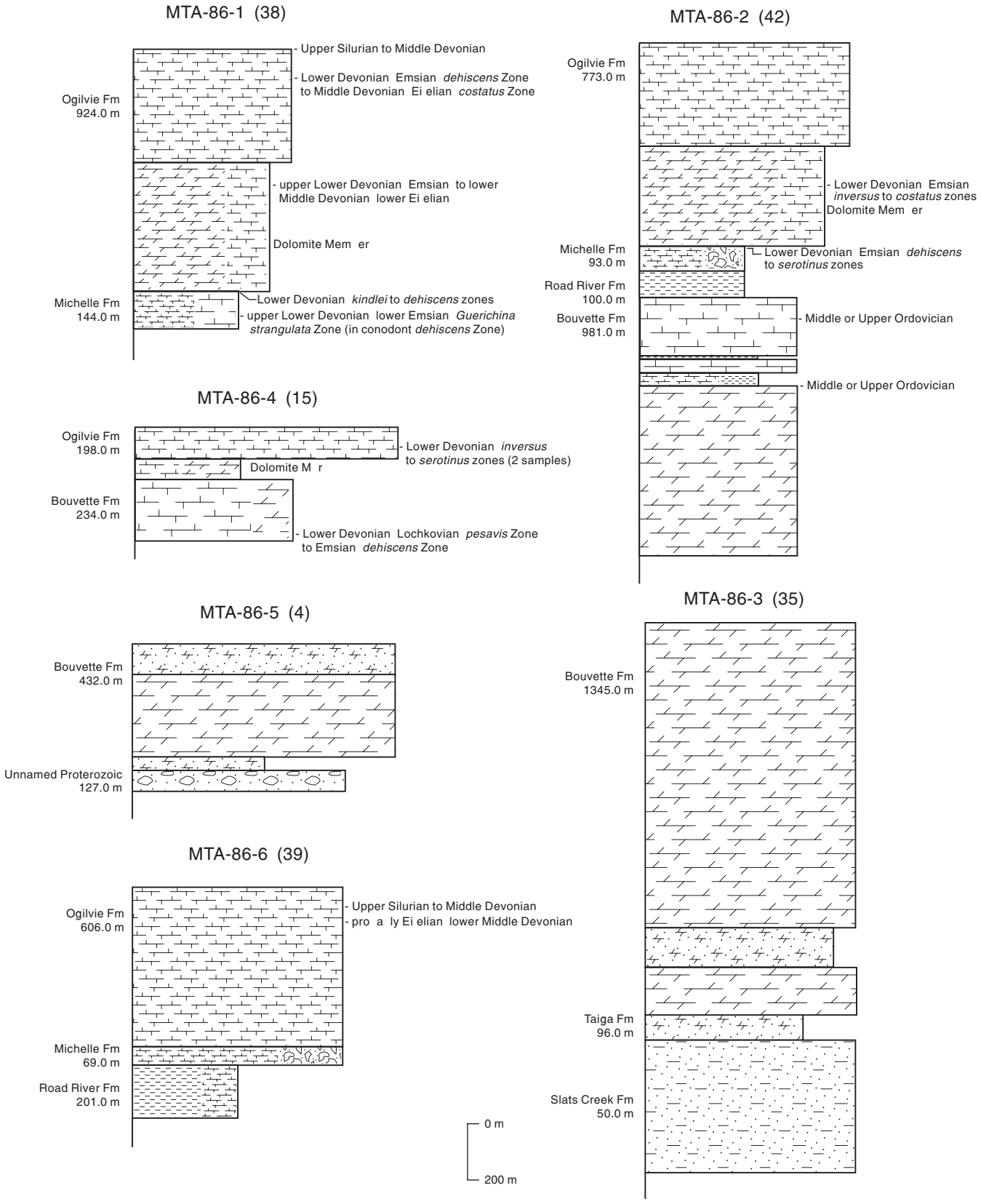
MTA-85-1 (2)



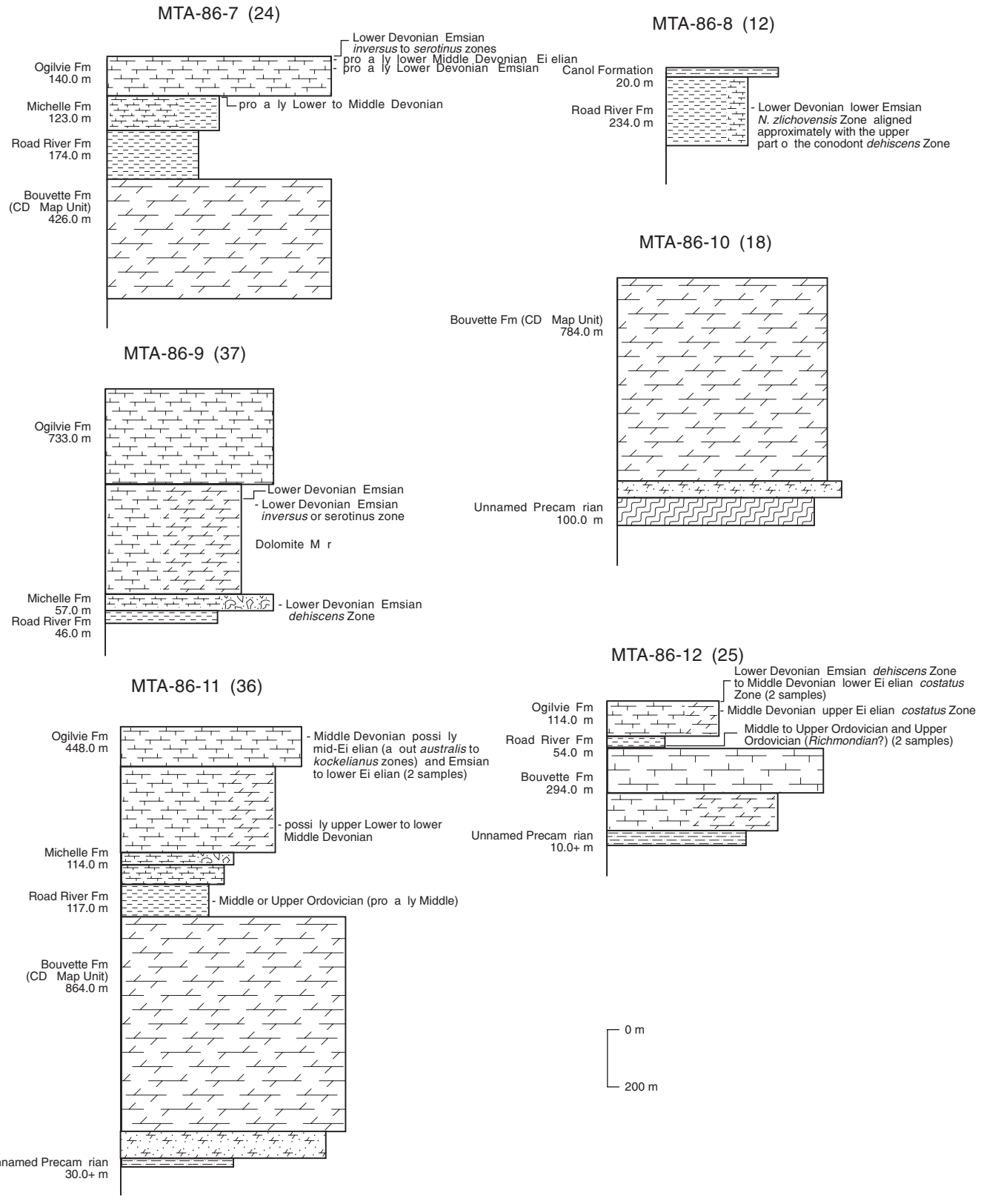
MTA-85-2 (17)



Columnar sections (G)
Stratigraphic Sections MTA-86-1 to MTA-86-6

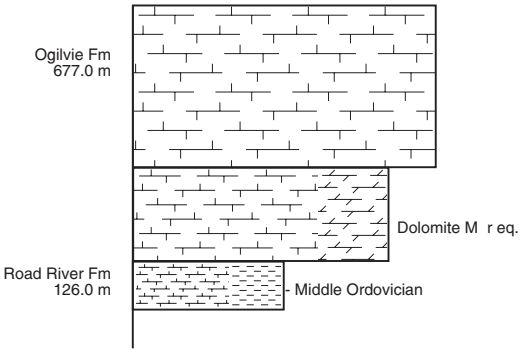


Columnar sections (H)
Stratigraphic Sections MTA-86-7 to MTA-86-12

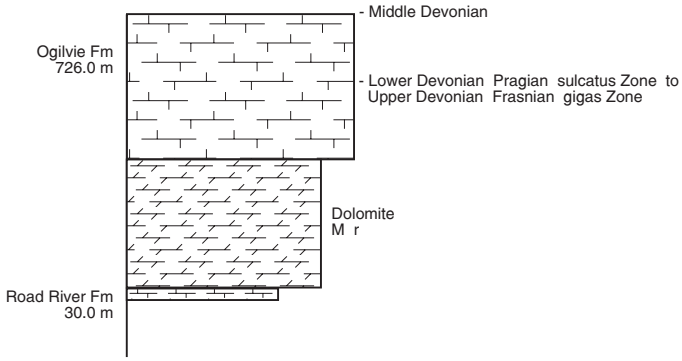


Columnar sections (I)
Stratigraphic Sections MTA-86-13 to MTA-86-17 MTA-86-19

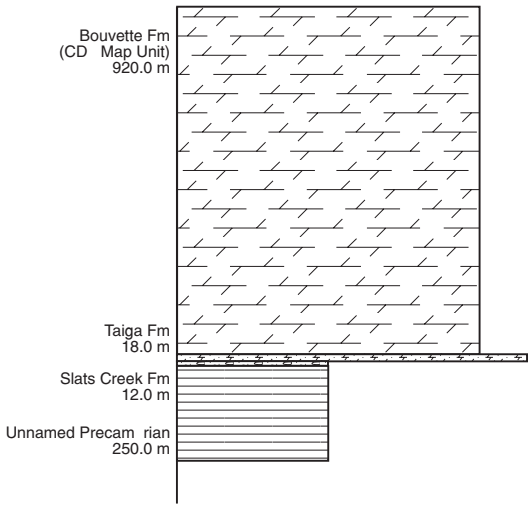
MTA-86-13 (40)



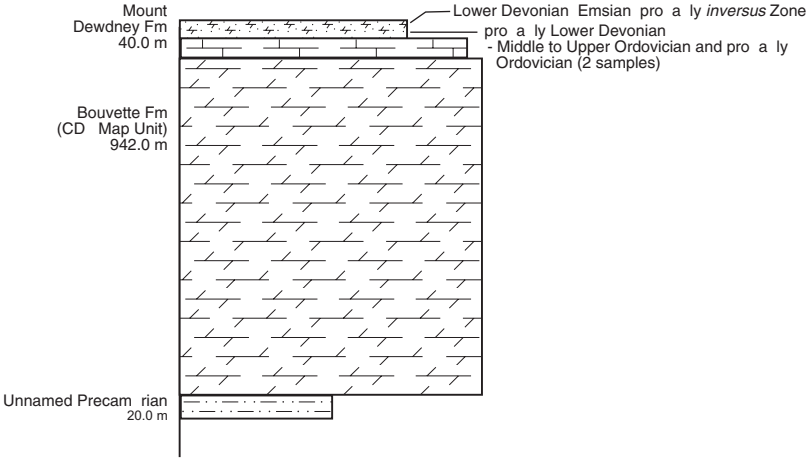
MTA-86-14 (43)



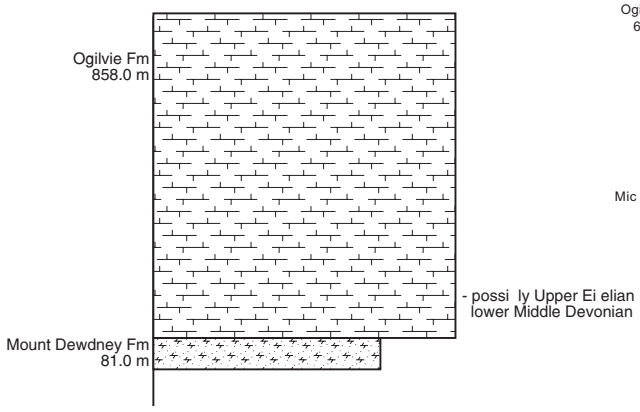
MTA-86-15 (11)



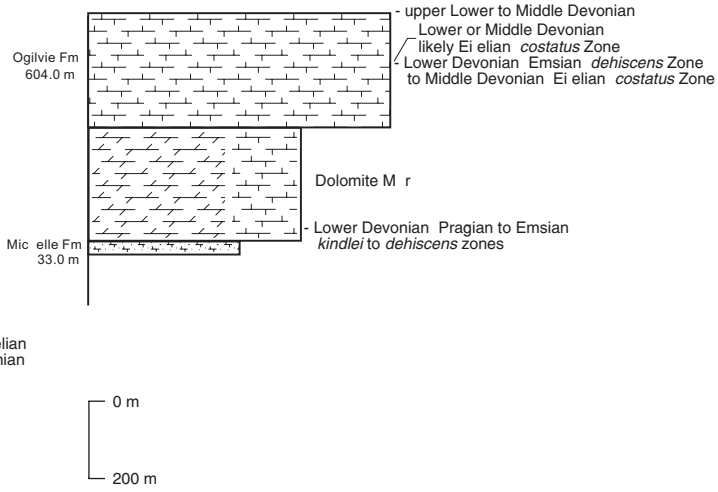
MTA-86-16 (55)



MTA-86-17 (56)

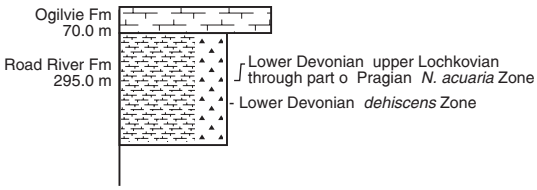


MTA-86-19 (31)

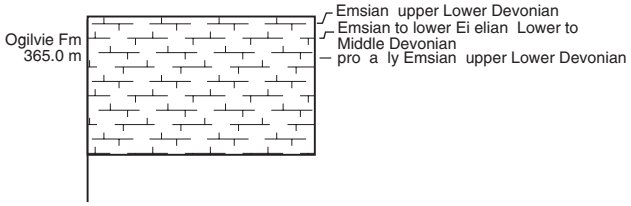


Columnar sections (J)
Stratigraphic Sections MTA-86-21 22 25 26 28
and Sections MTA-86-P1 P2 and P4

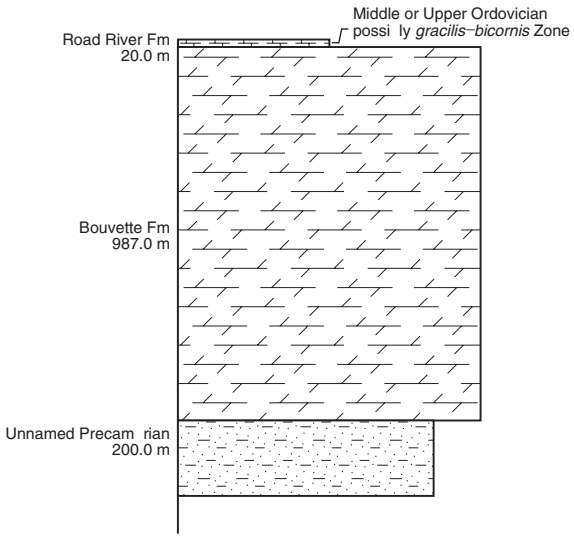
MTA-86-21 (20)



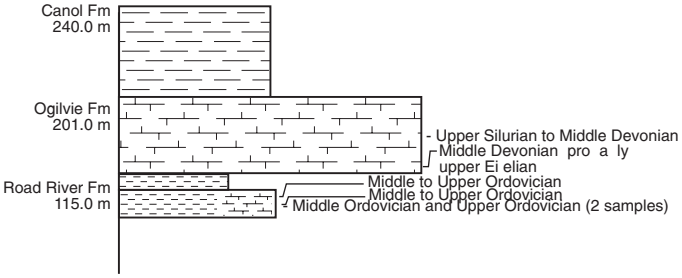
MTA-86-22 (33)



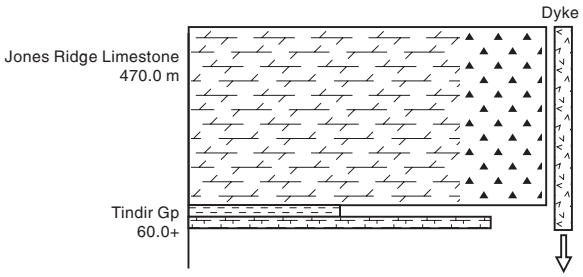
MTA-86-25 (7)



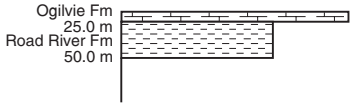
MTA-86-26 (54)



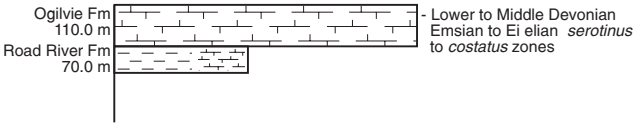
MTA-86-28 (21)



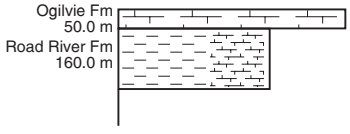
MTA-86-P1 (10)



MTA-86-P2 (26)

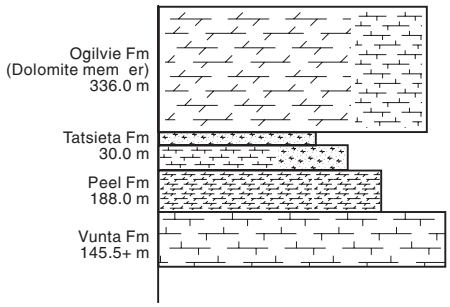


MTA-86-P4 (46)

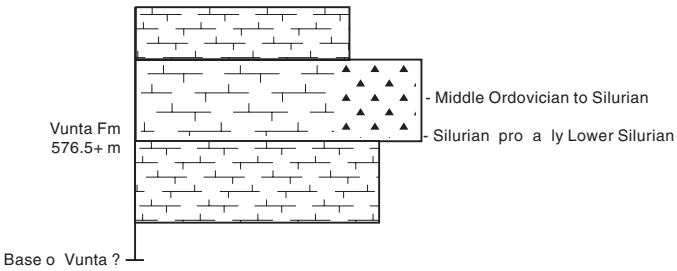


Columnar sections (K)
Stratigraphic Sections MTA-88-1 to MTA-88-3

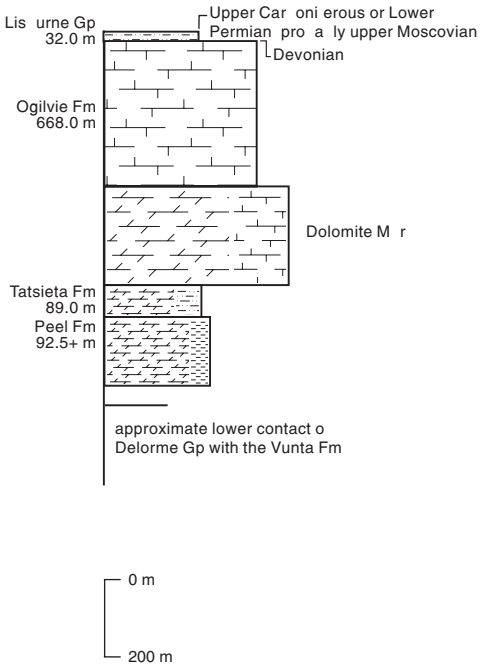
MTA-88-1



MTA-88-2



MTA-88-3



Columnar sections (L)
Stratigraphic Sections 1 to 5 (Cecile pers. comm.)