# MAR 20040023: BRAZEAU RANGE

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**GRAYMONT WESTERN CANADA INC.**

# 2004 EXPLORATION AND FIELDWORK AT THE BRAZEAU RANGE METALLIC AND INDUSTRIAL MINERALS PERMIT, WEST-CENTRAL ALBERTA

Metallic and Industrial Mineral Permit
9302090596

Geographic Coordinates

52°19' N to 52°30' N
115°43' W to 116°03' W

NTS Sheets 83 B/5, C/8 and C/9

2004 12 20

by

J. R. Dahrouge, B.Sc., P.Geol
R. Wolbaum, B.Sc., Geo. I.T

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## 1. SUMMARY

During August, 2002, September, 2003 and August, 2004, parts of Brazeau Range south of North Saskatchewan River, within Metallic and Industrial Mineral (MAIM) Permit 9302090596, were explored for high-quality carbonate rocks. Paleozoic carbonate units were examined and measured at more than 24 locations along Brazeau Range south of North Saskatchewan River. Carbonate units within the Devonian Palliser Formation, and within the Carboniferous Banff and Rundle assemblages were examined and their stratigraphic thicknesses recorded. About 113 m of the Palliser Formation and 15 m of the Banff Assemblage was examined along the southern part of Brazeau Range. In addition, more than 417 m of the Rundle Assemblage was examined at more than 21 locations. In total approximately 546½ m of strata was examined from more than 645½ m normal thickness measured.

From North Saskatchewan River, south to Sheeptrap Mountain, the Palliser Formation consists of massive, grey lime mudstones with interbeds of vuggy, dolomitic limestone. The Banff Assemblage was considered only as a datum for the base of the Rundle Assemblage and for the top of the Palliser Formation, as limestone units within it are commonly less than several metres thick. The Rundle Assemblage is composed of dolomite, lime mudstone, wackestone, and grainstone with minor interbeds of packstone.

As a previous assessment report (Pana and Dahrouge, 1998) includes descriptions of geographic setting, history and previous investigations for Brazeau Range, most of that information is not repeated here. Throughout this report attitudes of bedding and other planar features are given as A°/B° SW, where A° is the azimuth of the strike and B° is the amount of dip in the direction indicated. A magnetic declination of 18½° east was used. Where bedding has been obscured by structure, stratigraphic thicknesses were calculated using orientations from adjacent units. Where more than one bedding orientation was measured, the mean orientation is used.

## 2. INTRODUCTION

During the summers of 2002, 2003 and 2004, Dahrouge Geological Consulting Ltd. conducted exploration, on behalf of Graymont Western Canada Inc., for high-quality carbonate lithotypes within west-central Alberta. This assessment report describes the exploration conducted within MAIM Permit 9302090596, which encompasses the southern and eastern parts of Brazeau Range of the Alberta Foothills. It includes information on the geology and structure of more than 24

stratigraphic sections examined between 2002 and 2004; as well as, an interpretation of the results. This work was authorized by Peter Darbyshire, Vice President and General Manager for Graymont Western Canada Inc.

## 3. GEOGRAPHIC SETTING

MAIM Permit 9302090596 encompasses the southern part of Brazeau Range south of North Saskatchewan River and parts of the east side of Brazeau Range north of North Saskatchewan River, near Nordegg, Alberta. Nordegg, with year-round facilities is located 79 km west of Rocky Mountain House on Highway 11 (Fig. 3.1).

The southern portion of MAIM Permit 9302090596 is accessible via Highway 752 which branches southwest from Rocky Mountain House and North Fork Road 3 km west of Strachan, or 23 km east on a secondary road branching from Forestry Trunk Road about 28 km south of Highway 11. Access to the property is by all-terrain vehicle; however, new logging roads are being constructed, improving access.

Several creeks, mountains, and other features presently without names on published maps have been assigned informal names in this report to facilitate references to geographic locations.

## 4. PROPERTY, EXPLORATION AND EXPENDITURES

### 4.1 MAIM PERMIT 9302090596

In 2002, Graymont (nee: Continental Lime Ltd.) acquired MAIM Permit 9302090596 to cover Paleozoic limestones near Nordegg, Alberta (Table 4.1 and Fig 4.1). The permit covers the eastern flank of Brazeau Range north of North Saskatchewan River and the southern part of Brazeau Range, south of North Saskatchewan River. It is mainly within Land Use Zone 2, with portions within Zone 5, as designated by the Alberta Eastern Slopes Policy (Alberta Forestry, Lands, and Wildlife, 1988).

The area of MAIM Permit 9302090596 totals 7866 hectares (Fig. 4.1). Given exploration expenditures of $42,045.27 (Appendix 1, Section 4.3), the entirety of MAIM Permit 9302090596 will be maintained (Table 4.1).

**TABLE 4.1 DESCRIPTION OF MAIM PERMIT 9302090596**

| Comm. Date | Expiry Date | Land Description (Tp-RW5) | Size (Ha) |
|---|---|---|---|
| Sept. 4, 2002 | Sept. 4, 2004 | 39-13W5 (Sections 2NW; 3NE; 9N; 10; 11N,SW; 12N; 13S,NW 14; 15; 16; 17N,SE; 19; 20; 21; 22; 23; 24SW; 26SW; 27S,NW; 28; 29; 30; 31S; 32S; 33S)<br>39-14W5 (Sections 24NE; 25; 26NE; 35L1,L2; 36)<br>40-14W5 (Sections 1SW,L2,L11,L12,L13; 2L9,L16; 11SE, NW,L5,L6,L10; 14L4,L5; 15SE,NW,L6,L9,L10,L15; 16L16; 20L8,L9,L16; 21N,SE,L3,L5,L6; 22SW,L2, L12; 28W; 29; 30N,L1,L4,L5,L6,L7,L8; 31E,L3, L4,L14; 32S,L11,L12,L13)<br>40-15W5 (Sections 25L9N,L10N,L15,L16; 35NE,L1N,L2N, L7,L8; 36NW,L10,L15)<br>41-15W5 (Sections 1W,L2,L7,L10,L15; 2E) | 7,866 |

## 4.2 2002 to 2004 EXPLORATION

During August 13, 2002, September 21 to 23, 2003 and August 7 to 21, 2004 parts of Brazeau Range within MAIM Permit 9302090596 were examined by Dahrouge Geological Consulting Ltd. on behalf of Graymont Western Canada Inc. for high-quality carbonate rocks. Carbonate outcrops were examined at more than 24 locations (Appendices 2A, 2B and 2C; Fig.6.1; Table 4.2). A total of 213 intervals representing about 546½ m of strata were examined from more than 645½ m normal thickness investigated.

## 4.3 EXPLORATION EXPENDITURES

Between 2002 and 2004, exploration expenditures totalled $42,045.27, which resulted in an excess credit of $2,715.27 allocated to the assessment period 'Years 3 and 4', for MAIM Permit 9302090596. These expenditures are allocated to MAIM permit 9302090596 as follows:

| Assessment Period | Expiry Date | Required Expenditures | Assigned Expenditures |
|---|---|---|---|
| Years 1 and 2 | 2004-09-04 | $39,330 | $ 39,330.00 |
| Years 3 and 4 | 2006-09-04 | $78,660 | 2,715.27 |
| | | **Total:** | $ 42,045.27 |

## TABLE 4.2 LOCATIONS EXAMINED AND MEASURED IN 2002, 2003 AND 2004

| Section Number | Location | Measured Intervals | Strat. Thick. (m)* | Measured Thick. (m)° |
|---|---|---|---|---|
| | **2002** | | | |
| 2002-01 | SW of Fire Tower | 2 | 12½ | 12½ |
| 2002-02 | SW of Fire Tower | 0 | 20¾ | 21¾ |
| | SUBTOTALS: | 12 | 33¼ | 34¼ |
| | **2003** | | | |
| 2003-01 | South Flank, Brazeau Range | 8 | 21½ | 25½ |
| 2003-02 | West Flank, Brazeau Range | 8 | 24 | 26½ |
| 2003-03 | South Flank, Brazeau Range | 8 | 14 | 14 |
| 2003-04 | West of Dizzy Creek | 6 | 14 | 14 |
| 2003-05 | West of Dizzy Creek | 15 | 46½ | 46½ |
| 2003-06 | West of Dizzy Creek | 9 | 24½ | 24½ |
| 2003-07 | West of Dizzy Creek | 7 | 19 | 19 |
| | SUBTOTALS: | 61 | 163½ | 170 |
| | **2004** | | | |
| Isolated | Dizzy Creek | 2 | 6 | 6 |
| 2004-01 | Dizzy Creek | 8 | 20¼ | 20¼ |
| 2004-02 | Dizzy Creek | 5 | 17 | 17 |
| 2004-03 | Dizzy Creek | 12 | 37 | 37 |
| Isolated | Dizzy Creek, core of Brazeau anticline | 1 | - | - |
| 2004-04 | West of Fire Tower | 9 | 19 | 19 |
| 2004-05 | WSW of Fire Tower | 6 | 11¼ | 11¼ |
| 2004-06 | SW of Fire Tower | 6 | 16 | 16¼ |
| 2004-07 | Peak of Spider Mountain, WSW of Fire Tower | 11 | 28¼ | 33½ |
| 2004-08 | South of Spider Mountain | 6 | 16½ | 21 |
| 2004-09 | ESE of Fire Tower | 10 | 21¼ | 29½ |
| 2004-10 | West of Ram Mountain | 9 | 20 | 27 |
| 2004-11 | Ram Mountain | 13 | 28¾ | 38¼ |
| 2004-12 | North of Sheeptrap Mountain | 11 | 30½ | 46½ |
| 2004-13 | NE of Sheeptrap Mountain | 21 | 56¾ | 78¾ |
| 2004-14 | West of Shunda Mountain | 6 | 13¼ | 25 |
| 2004-15 | East of Sheeptrap | 4 | 7 | 9 |
| | SUBTOTALS: | 140 | 349¾ | 441¼ |
| | **TOTALS:** | **213** | **546½** | **645½** |

* Stratigraphic thicknesses are examined thicknesses.
° Measured thicknesses are total investigated thicknesses, including covered and inaccessible intervals.

# 5. REGIONAL GEOLOGY

In west-central Alberta, Paleozoic limestones are known to occur within the Middle Cambrian Eldon Formation, the Upper Devonian Mount Hawk Formation, the Upper Devonian Palliser Formation, the Upper Devonian to Lower Carboniferous Banff Assemblage and the Lower Carboniferous Rundle Assemblage (Table 5.1).

Descriptions of the stratigraphy of the Palliser Formation, the Banff Assemblage and the Rundle Assemblage in Section 5.1 herein, are from a prior assessment report by Pana and Dahrouge

(1998). A detailed review of the regional stratigraphy is provided by Stott and Aitken (1993), Mossop and Shetsen (1994), Halbertsma (1994), and Richards et al. (1994).

## 5.1 STRATIGRAPHY

### 5.1.1 Mount Hawk Formation

Along Front Ranges of the Rocky Mountains, the Upper Devonian Fairholme Group was transgressivelly deposited on eroded Upper Cambrian strata, and consists of two carbonate reef formations, the Cairn and the overlying Southesk formations (Table 5.1). Both are replaced basinward by the laterally equivalent argillaceous beds of the Flume, Maligne, Perdrix, and Mount Hawk formations (Mountjoy et al., 1992).

The Upper Devonian Southesk Formation at its type section on Mount Dalhousie, near the confluence of Southesk and Brazeau rivers, is 161 m thick and divided into the Peechee, Grotto, and Arcs members (MacKenzie, 1966; Mountjoy et al., 1992). To the west it thins into argillaceous dolomites and dolomitic shales of the Mount Hawk Formation.

Where Highway 11 crosses Brazeau Range, the upper part of the Mount Hawk Formation, consists of cryptocrystalline, black, medium-bedded, argillaceous limestone (Douglas, 1956).

### 5.1.2 Palliser Formation

In west-central Alberta, the Upper Devonian Palliser Formation consists mainly of outer shelf and basinal carbonates of the Sassenach Basin (Halbertsma, 1994). The Palliser Formation is divisible into the Morro and overlying Costigan members, which are separated by an unconformity. The Morro Member comprises a lithologic suite dominated by carbonates with significant lateral facies variations. The Costigan Member consists of open-marine fossiliferous limestones and shales, with local evaporitic sedimentation. Within Foothills and Front Ranges of Alberta, limestones of the Palliser Formation vary from less than 180 m to more than 270 m in thickness (Holter, 1976).

The Palliser Formation is overlain by shales of the Exshaw Formation, and siliciclastics and carbonates of the Banff Assemblage.

### 5.1.3 Banff Assemblage

In west-central Alberta, the Exshaw, Banff and Yohin formations comprise the Banff Assemblage (Richards et al. 1994). The Upper Famennian to Lowermost Tournaisian Exshaw Formation is dominated by fine-grained siliciclastics deposited in euxinic basin to shallow-neritic environment. In general, it is unconformably overlain by the Lower to Upper Tournaisian Banff

Formation, which is a heterogeneous association of carbonates and fine-grained siliciclastics deposited on poorly differentiated carbonate platforms. Westward, the uppermost Banff Formation grades laterally into the Rundle Assemblage.

### 5.1.4 Rundle Assemblage

The Lower Carboniferous Rundle Assemblage extends from MacKenzie Mountains in the Arctic south through the Peace River Embayment to southeastern British Columbia. In west-central Alberta, it comprises shallow-marine platform and ramp carbonates which prograded westward over deeper water shales and carbonates of the Banff Assemblage. The lower Rundle Assemblage is subdivided into the transgressive carbonate Pekisko Formation, and two regressive successions of restricted-marine carbonates and subordinate anhydrite assigned to the Shunda and Turner Valley formations (Richards et al. 1994). In southern Alberta the Pekisko grades laterally into the uppermost Banff Formation. The Turner Valley Formation extends from east-central British Columbia to southwest Alberta. According to Richards et al. (1994), the Turner Valley Formation thickens to the southwest and for most of its length is 50 m to 120 m thick. The type section near Turner Valley is 152 m thick and divisible into four beds.

Earlier work by Douglas (1958), and MacQueen and Bamber (1968) indicate that the eastern peritidal sequences of the uppermost Pekisko, Shunda and lower Turner Valley grade south and southwestward into the more open-marine sequence of the Livingstone Formation (Table 5.1). The upper Rundle Assemblage includes the transgressive Mount Head Formation.

## 5.2 STRUCTURE

In Front Ranges and Foothills of west-central Alberta, Paleozoic and Mesozoic strata have been repeated along several major thrust faults. Displacements along these faults are interpreted to be tens of kilometres. Within individual thrust sheets regional-scale folds exhibit a spatial relation to their leading edges. Near Nordegg, the main structural discontinuity is the northwest to southeast trending Brazeau Thrust. The leading edge of the thrust sheet is folded into the asymmetrical to recumbent Brazeau Anticline.

**TABLE 5.1 GENERALIZED PALEOZOIC STRATIGRAPHY OF FOOTHILLS AND FRONT RANGES, WEST-CENTRAL ALBERTA***

| System or Subsystem | Stratigraphic Unit | | |
|---|---|---|---|
| | Assemblage / Group | Formation | |
| | | S | N |
| Lower Carboniferous | Rundle Assemblage | Mount Head | |
| | | [1] Livingstone | Turner Valley |
| | | | Shunda |
| | | | Pekisko |
| | Banff Assemblage | Banff | |
| | | Exshaw | |
| Upper Devonian | | [1] Palliser | |
| | | Alexo | |
| | Fairholme Group° | Southesk | Mount Hawk |
| | | Cairn | |
| Cambrian | | Pika | |
| | | Eldon | |
| | | Stephen | |
| | | Cathedral | |

*Compiled from MacKenzie 1969, Richards et al. 1994, Switzer et al., 1994., and Holter, 1994.
° Fairholme Group of MacKenzie (1969) is partly equivalent to the Woodbend Group (Switzer et al., 1994).
[1] Current limestone production (*from* Holter, 1994)

# 6. PERMIT GEOLOGY

## 6.1 MEASURED SECTIONS

Carbonate lithologies of the Palliser Formation, Banff Assemblage and Rundle Assemblage were examined and measured along Brazeau Range, south of North Saskatchewan River (Fig. 6.1). Between 2002 and 2004, 213 discrete intervals were examined at the locations listed in Table 4.2, by chipping outcrops perpendicular to bedding. Where bedding could not be identified, chips were taken in directions appropriate to topography with stratigraphic thickness deduced from other measurements where possible (Appendix 2). A solution of 5% HCl was used to assess quality in the field. The 213 intervals represent a stratigraphic thickness of about 546½ m and were collected from an investigated stratigraphic thickness that exceeds 645½ m.

## 6.2 STRATIGRAPHY

Immediately south of North Saskatchewan River, the uppermost 20 m of the Palliser Formation, which was examined in 2003 (Appendix 2B) consists of tan-grey to dark-grey, micritic, generally thick-bedded mudstone. The middle to upper parts of the Palliser Formation are commonly dolomitic, while the lowermost parts were not examined. East of and down slope from the Ram Fire Tower, three prominent benches of the middle to upper Palliser Formation were examined in 2004 (Appendix 2C). The 22 m examined in 2004 is similar to that examined in 2003, described as dark-grey to tan, micritic, massive mudstone with dolomitic interbeds. Laminations are visible in places and medium-grey mottling apparent. The benches are overlain by recessive shales of the Banff Assemblage. Throughout Brazeau Range, the Banff Assemblage consists of siliceous and dolomitic limestone to limey shale, with occasional interbeds of limestone.

According to Erdman (1950, p. 11) the overlying Rundle Assemblage

> "outcrops as a peripheral strip around the Brazeau Range, and forms an almost continuous dip-slope on the southwestern flank... . The lowest member is a massive, light-weathering, coarse-grained limestone".

Previously measured thicknesses of the lower part of the Rundle Assemblage (Fig. 6.1) from Brazeau Range follow :

| Location | Reference | Thick. (m) |
|---|---|---|
| Shunda Mountain* | Douglas (1958) | 32½ |
| Nordegg Lime Quarry* | Matthews (1960)° | ~50¾ |
| Dizzy Creek | Erdman (1950) | 51¾ |

* North of North Saskatchewan River
° *cf* Holter (1976)

Through Dizzy Creek, the lower part of the Rundle Assemblage generally consists of grey to grey-brown, coarse-grained, thick-bedded to massive, crumbly wackestone to grainstone, containing peloids and crinoids (Appendices 2A, 2B and 2C). Examined thicknesses of sections ranged from 17 to 37 metres. At Sheeptrap Mountain, accessible sections were between 13 and 31 metres thick.

They are comprised of grey, medium- to coarse-grained, thin-bedded to massive lime mudstone to wackestone, containing pellets, crinoids and rugose corals; with interbeds of dolomite and dolomitic limestone. The lower to middle parts of the Rundle Assemblage consist of generally recessive, argillaceous mudstone.

A section within the middle portion of the Rundle Assemblage, over 45 metres thick, was examined at Sheeptrap Mountain. It contains grey to dark-grey and grey-brown, generally fine-grained lime mudstone to wackestone, with chert nodules, brachiopods and some dolomitic interbeds.

Overlying units generally consist of thin-bedded, microcrystalline, dolomite and dolomitic breccias.

### 6.3 STRUCTURE

From North Saskatchewan River to south of Sheeptrap Mountain, Brazeau Thrust represents a decollement underlying a zone of imbricate faulting (Fig. 6.1). Subsidiary thrust faults are present along Dizzy Creek, about 4 km northwest of Sheeptrap Mountain (Erdman, 1950). At Sheeptrap Mountain a low-angle thrust with minimal displacement is present in the southwest limb of the Brazeau Anticline. Bedding attitudes are little affected by this low-angle thrust with dipslopes of about 20° to 30° SW. Further to the north, strata dip at about 40° to 44° SW, forming dipslopes and partial dipslopes along the southwest flank of Brazeau Range (Fig. 6.1). East of Sheeptrap Mountain, Erdman (1950) mapped numerous subsidiary folds in the east limb of Brazeau Anticline.

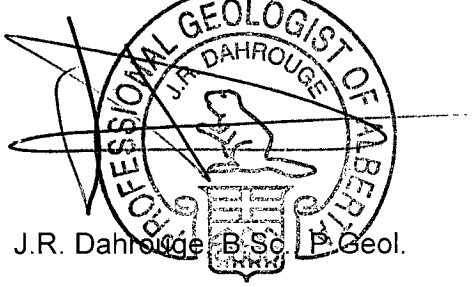
## 7. CONCLUSIONS

Within MAIM Permit 9302090596, exposures of the Palliser Formation, Banff Assemblage and Rundle Assemblage were examined along the southern part of Brazeau Range, south of North Saskatchewan River. A total of 213 discrete intervals were measured and described in detail, representing approximately 546½ m of stratigraphy out of a total investigated thickness of more than 645½ m.

Carbonate intervals within the upper parts of the Palliser Formation were examined east of the Ram Fire Tower, and just south of North Saskatchewan River at Brazeau Range. The uppermost parts of the Palliser Formation consist of micritic, massive lime mudstones, with dolomitic interbeds and mottled surfaces. The middle to upper parts are generally dolomitic and the lower part was not examined. The lower part of the Rundle Assemblage generally consists of fossiliferous, medium- to coarse-grained, massive limestone to grainstone. The middle part of the Rundle Assemblage is comprised of fine-grained lime mudstone to wackestone with chert nodules. Locally, rapid facies changes result in interbeds of variably dolomitic limestone and dolomite.

[redacted]

R. Wolbaum, B.Sc. Geol. I.T.




J.R. Dahrouge, B.Sc. P.Geol.

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2004 12 20

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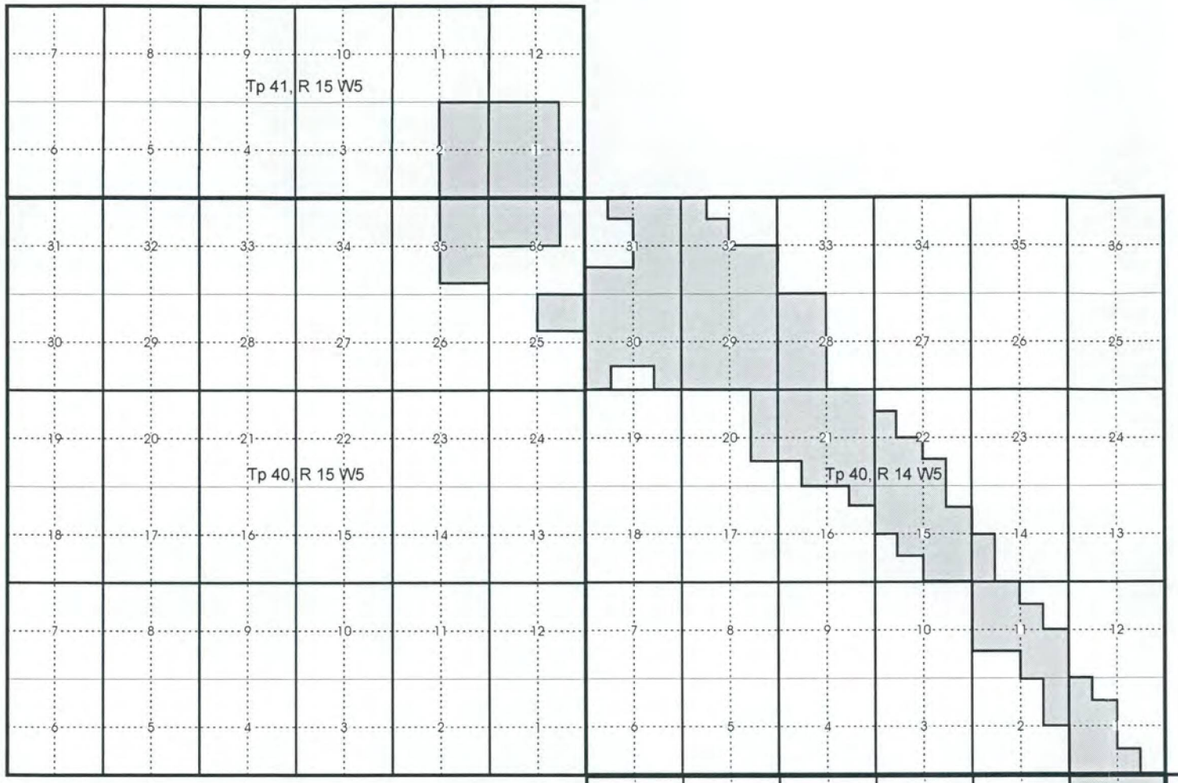
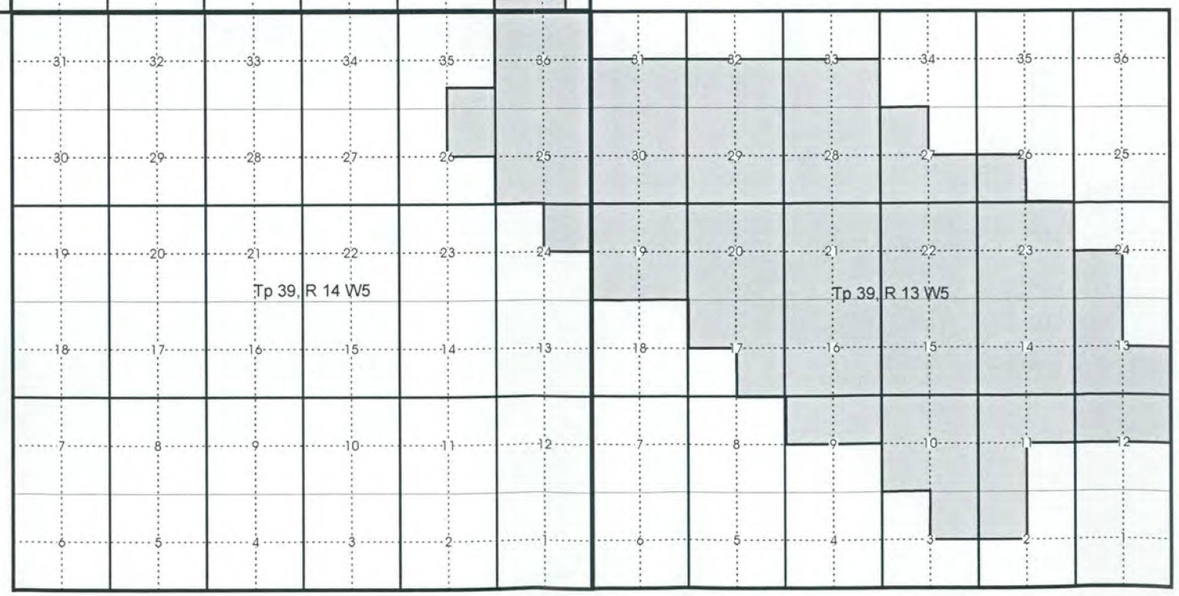
BRAZEAU RANGE,
WEST-CENTRAL ALBERTA

Fig. 3.1 Location Map

NM 2004.12




## Brazeau area Permits

Current area of MAIM Permit # 9302090596 (7866 ha.)

Scale
0 1 2 5 10
Kilometers

N

PROFESSIONAL GEOLOGIST OF ALBERTA
J.F. DAHROUGE

GRAYMONT WESTERN CANADA INC.

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WEST CENTRAL ALBERTA

Fig. 4.1
Location of Maim
Permit 9302090596

NM 2004.09

# APPENDIX 1: ITEMIZED COST STATEMENT FOR METALLIC AND INDUSTRIAL MINERALS PERMIT 9302090596 OF GRAYMONT WESTERN CANADA INC.

## a) Personnel

J. Dahrouge, B.Sc., P.Geol. (Geologist)
2.8 days organizing, editing and preparing report
[redacted] $ [redacted]

W. McGuire, (Draftsman, Field Assistant)
7.9 days review section locations, drafting, preparing base map and other figures
[redacted] $ [redacted]

R. Wolbaum, B.Sc. (Geologist)
15.0 days field work and travel between August 7 to 21, 04
9.9 days preparations for field, compile field data, report writing, and other
[redacted] $ [redacted]

J. Tanton, B.Sc. (Geologist)
15.0 days field work and travel between August 7 to 21, 04
2.5 days organize field gear, edits to base map, other
[redacted] $ [redacted]

N. McCallum, B.Sc. (Geologist)
15.0 days field work and travel between August 7 to 21, 04
2.6 days compile field data
[redacted] $ [redacted]

J. Wolbaum, (Field Assistant)
15.0 days field work and travel between August 7 to 21
[redacted] $ [redacted]

$ 26,214.48

## b) Food and Accommodation

| | | | |
|---|---|---|---|
| 60 man-days @ $68.99 | accommodations (motel) | $ 4,139.52 | |
| 60 man-days @ $27.39 | groceries and meals | $ 1,643.60 | |
| | | | $ 5,783.12 |

## c) Transportation

| | | | |
|---|---|---|---|
| ATV: | Quad Rental (3 days) | $ 529.65 | |
| | Quad Rental (11 days) | $ 1,488.91 | |
| | Quad and Trailer Rental (14 days) | $ 2,059.75 | |
| Helicopter: | Helicopter Charter | $ 1,942.05 | |
| Vehicles: | Truck Rental (15 days) | $ 2,369.60 | |
| | Car mileage 216 km | $ 95.04 | |
| | Fuel | $ 624.69 | |
| | | | $ 9,109.68 |

## APPENDIX 1: CONTINUED

| | | | | |
|---|---|---|---|---|
| **d) Instrument Rental** | n/a | | | |
| **e) Drilling** | n/a | | | |
| **f) Analyses** | n/a | | | |
| **g) Report** | Reproduction and assembly | $ 80.30 | | |
| | | | $ | 80.30 |
| **h) Other** | | | | |
| | Base map(s) and map reproductions | $ 312.13 | | |
| | Courier, postage and shipping | $ 79.16 | | |
| | Digital Topographic Data | $ 264.83 | | |
| | Field supplies | $ 166.06 | | |
| | Long distance telephone | $ 35.53 | | |
| | | | $ | 857.69 |
| **Total** | | | $ | 42,045.27 |

I, Jody R. Dahrouge, hereby certify that the costs outlined above were expended for the assessment of metallic and industrial minerals permits 9302090596.

[redacted]

Jody R. Dahrouge, B.Sc., Sp.C., P.Geol.

Commissioner for Oaths

JACK LAMOUREUX
COMMISSIONER FOR OATHS
COMMISSION EXPIRES
MAY 21, 2005

# APPENDIX 2A: DESCRIPTIONS OF THE 2002 STRATIGRAPHIC SECTIONS WITHIN MAIM PERMIT 9302090596, BRAZEAU RANGE

Note: Stratigraphic thicknesses are based on measured attitudes of bedding, as listed below, with appropriate interpolations. Attitudes are strike and dip. UTM coordinates are NAD83. Examined intervals are listed in order from stratigraphic top to bottom.

Abbreviations: Pal - Palliser Formation; Exshaw - Exshaw Formation; Banff - Banff Assemblage; RA - Rundle Assemblage; Fernie - Fernie Formation; Luscar - Luscar Formation

| Sample | Formation Member | Strat. Thick. (m) | Description |
|---|---|---|---|
| **BR2002-01: 600 m SW of Fire Tower** (UTM 587828E, 5800601N) | | | |
| 10980 | RA | >10 | Wackestone - Grainstone, similar to 10979, inaccessible cliffs |
| 10979 | RA | 2½ | Wackestone - Grainstone, brown-grey, fetid odor, abundant hydrocarbon staining, beds 5-25 cm, attitude of beds 098°/45° W |
| **BR2002-02: 960 m SW of Fire Tower** (UTM 581984E, 5800892N) | | | |
| 15710 | Banff (?) | 3 | Grainstone, medium-grey, medium-grained |
| 15709 | Banff (?) | 1½ | Wackestone - Mudstone, dark-grey, fine-grained, poor to moderate HCl reaction, recessive, chert nodules |
| - | - | ~1 | covered, interval of cherty scree |
| 15708 | Banff (?) | 1¼ | Grainstone, medium-grey, medium grained |
| 15707 | Banff (?) | 1½ | Dolomitic Wackestone, medium-brown-grey to dark-grey, fine-grained, well bedded, attitude of beds 120°/34° SW |
| 15706 | Banff (?) | 1½ | Grainstone, medium- to dark-grey |
| 15705 | Banff (?) | 3 | Grainstone, medium-grey, medium-grained, abundant brachiopods and crinoids |
| 15704 | Banff (?) | 3 | Dolomitic Grainstone, medium-grey, coarse-grained, massive, crinoids to 5 mm |
| 15703 | Banff (?) | 1 | Dolomitic Grainstone, tan-grey, medium- to fine-grained, poor HCl reaction, crinoids |
| 15702 | Banff (?) | 2 | Grainstone, medium-grey, coarse-grained, crinoids |
| 15701 | Banff (?) | 3 | Grainstone, medium- to light-grey, coarse-grained, crinoid rich, massive |

# APPENDIX 2B: DESCRIPTIONS OF THE 2003 STRATIGRAPHIC SECTIONS WITHIN MAIM PERMIT 9302090596, BRAZEAU RANGE

Note: Stratigraphic thicknesses are based on measured attitudes of bedding, as listed below, with appropriate interpolations. Attitudes are strike and dip. UTM coordinates are NAD83. Examined intervals are listed in order from stratigraphic top to bottom.

Abbreviations: Pal - Palliser Formation; Exshaw - Exshaw Formation; Banff - Banff Assemblage; RA - Rundle Assemblage; Fernie - Fernie Formation; Luscar - Luscar Formation

| Sample | Formation Member | Strat. Thick. (m) | Description |
|---|---|---|---|
| **BR2003-01: South Flank Brazeau Range, 1.5 km Southeast of North Saskatchewan River** (UTM 576639, 5804854) | | | |
| - | - | 4 | Argillaceous Limestone, platy, dolomitic, several metres covered above, possibly Exshaw |
| 14608 | PAL | 1½ | Mudstone, grey weathered and fresh, fine-grained, very vuggy, pyritic, rusty nodules, abundant secondary white calcite veins, attitude of beds 145°/32° SW |
| 14607 | PAL | 3½ | Mudstone, light-grey weathered, dark- to medium-grey fresh, with some brownish-grey mottles, fine-grained, fractures with rusty material, generally massive |
| 14606 | PAL | 3½ | Mudstone, medium-grey weathered with some tan stain, grey to medium-grey fresh, fine-grained, secondary white calcite, veinlets, thinner beds than below, some laminations, fossils |
| 14605 | PAL | 3¾ | Mudstone, medium-grey weathered, with some tan stain, light-grey to medium-grey fresh, fine-grained, secondary white calcite, veilets |
| 14604 | PAL | 1 | Argillaceous Limestone, tan-grey weathered, medium- to dark-grey fresh, fine-grained, platy to 15 cm beds |
| 14603 | PAL | 3¼ | Mudstone, lower 1¾ m, medium-grey weathered and fresh, Mudstone, upper 1½ m, light-grey weathered and fresh, weakly laminated |
| 14602 | PAL | 3 | Mudstone, light-grey weathered with rusty fractures, medium to dark-grey fresh, attitude of beds 151°/36° W |
| 14601 | PAL | 2 | Dolomitic Mudstone, buff-grey weathered, medium- to dark-grey fresh, fine-grained, laminated |
| **BR2003-02: West Flank Brazeau Range, 1.5 km South of North Saskatchewan River** (UTM 576443, 5804324) | | | |
| 17425 | RA | 1¾ | Siliceous Limestone, light-grey weathered, light-brownish-grey fresh, microcrystalline, some scattered crinoid debris, laminae with some cross-lamination, beds less than 20 cm, some Dolomitic interbeds, attitude of beds 144°/40° W |
| - | - | 1½ | covered |
| 17424 | RA | 2¼ | Packstone to Grainstone, light-grey weathered, medium-brownish-grey fresh, some grains to 2-3mm, beds less than 1m, few scattered crinoids |
| 17423 | RA | 4½ | Wackestone to Packstone, light-grey weathered, grey- to medium-brownish-grey fresh, abundant pellets, scattered crinoid debris, beds ¾m, massive, some sections crumbly, weathered |
| 17422 | RA | 2¾ | Wackestone, light-grey weathered, grey- to medium-brownish-grey fresh, abundant pellets, scattered crinoid debris, beds ½ -1m |
| 17421 | RA | 2¾ | Grainstone, gradational up to Wackestone, coarse-grained, massive, cumbly, abundant scattered crinoid debris, attitude of beds 145°/41° W. |
| 17420 | RA | 3¾ | Wackestone to Grainstone, light-grey weathered, medium-brownish-grey fresh, massive, cumbly, scattered crinoid debris |
| 17419 | RA | 4¾ | Lime Mudstone, light-grey weathered, medium-brownish grey fresh, massive, micritic to very fine-grained, some thin intervals of Wackestone |
| - | - | 1 | Covered |
| 17418 | RA | 1½ | Lime Mudstone to Wackestone, grey-weathered, medium-grey fresh, some grains to 2mm, beds ¼m, vuggy with some brown to tan material lining vugs, abundant fractures/joints, abundant secondary white calcite stringers/blebs |

# APPENDIX 2B: CONTINUED

| Sample | Formation Member | Strat. Thick. (m) | Description |
|---|---|---|---|
| **BR2003-03: South Flank Brazeau Range, 1.5 km Southeast of North Saskatchewan River** (UTM 576460, 5804310) | | | |
| 17417 | RA | 1 | Wackestone, light-grey weathered, medium- to brownish-grey fresh, grains less than 2 mm, beds ¼ - ½m. |
| 17416 | RA | 1¾ | Siliceous Limestone, micritic, platy beds to ¼ m, interbedded with silliceous Micritic Limestone, very light grey, slow HCl reaction, beds less than 10 cm, attitude of beds 149°/54° W |
| 17415 | RA | 2½ | Lime Mudstone to Wackestone, grey weathered, brownish-grey fresh, some scattered pellets up to 2mm, platy |
| 17414 | RA | 2½ | Packstone to Grainstone, medium-grey weathered and fresh, medium- to coarse-grained, pellets, crinoids, rubbly subcrop, interbeds to 10 cm, scattered outcrops partly covered |
| 17413 | RA | 1 | Packstone, last ¼m corase-grained Grainstone, medium-grey weathered, light-grey fresh, grains 1-2mm, scattered pellets and crinoid debris, massive, crumbly, vuggy with some buff-brown material along vugs |
| 17412 | RA | 2½ | Packstone to Grainstone, medium-grey weathered, light-grey fresh, grains 1-2mm, scattered pellets and some crinoid debris, massive |
| 17411 | RA | 1¼ | Lime Mudstone, medium-grey weathered, medium-brownish-grey fresh, cryptocrystalline to very fine-grained, beds less than ¼m, platy, attitude of bed 132°/46° W |
| 17410 | RA | 1½ | Lime Mudstone, medium-grey weathered, medium-brownish-grey fresh, cryptocrystalline to very fine grained, beds <¼ - 1m, attitude of beds 132°/46° W |
| **BR2003-04: 4.5 km Southeast of North Saskatchewan River, 700 m west of Dizzy Creek** (UTM 578262, 5802568) | | | |
| 14967 | RA | 1 | Wackestone/Packstone, medium-grey weathered and fresh, coarse-grained, bitumen stain |
| 14966 | RA | 3 | Dolomitic Wackestone, medium-grey weathered, light-grey fresh, coarse-grained, sugary texture, peloids, rugose coral |
| 14965 | RA | 1½ | Grainstone, light-grey weathered, black fresh, coarse-grained, rugose coral, crinoid, brachiopod, oil smell, crumbly |
| 14964 | RA | 1½ | Dolomite, light-grey weathered, medium-grey fresh, calcite veins |
| 14963 | RA | 3 | Mudstone, light-grey weathered, black fresh, cryptocrystalline, calcite |
| 14962 | RA | 4 | Mudstone, light-grey weathered, black fresh, microcrystalline to cryptocrystalline, calcite veins |
| **BR2003-05: 4.5 km Southeast of North Saskatchewan River, 800 m west of Dizzy Creek** (UTM 578549, 5803283) | | | |
| 14595 | PAL | 4 | Dolomitic Mudstone, light-grey weathered, grey-brown fresh, fine-grained, vuggy, laminated, well bedded, attitude of beds 131°/32° SW |
| 14594 | PAL | 1½ | Lime Mudstone, light-grey weathered and fresh, fine-grained, laminated, vuggy at top of section |
| 14593 | PAL | 4 | Dolomitic Mudstone, light-grey weathered and fresh, fine-grained, laminated |
| 14592 | PAL | 4 | Dolomitic Mudstone, light-grey weathered, tan fresh, fine-grained, interbedded with dark-grey mudstone, vugs, sparry calcite and chert stringers |
| 14591 | PAL | 3 | Dolomitic Limestone, light-grey weathered, dark-grey to tan fresh, fine-grained, strongly jointed laminations, brown-grey chert bed (to 4 cm thick) vugs with tan material |
| 14590 | PAL | 3 | Dolomitic Mudstone, as per 14587 |
| 14589 | PAL | 3 | Dolomitic Mudstone, light-grey mottled weathered, medium-grey-brown fresh, fine-grained, chert stringers, spar, vuggs, secondary dolomite, breccia zone with clasts up to 2 cm |
| 14588 | PAL | 3 | Dolomitic Mudstone, as per 14583 |
| 14587 | PAL | 3 | Dolomitic Mudstone, light-grey weathered, medium-grey-brown fresh, fine-grained, vuggy, calcite blebs, chert stringers |
| 14586 | PAL | 3 | Dolomitic Mudstone, light-grey weathered, brown fresh, fine-grained, bedding parallel calcite stringers, vuggy |

## APPENDIX 2B: CONTINUED

| Sample | Formation Member | Strat. Thick. (m) | Description |
|---|---|---|---|
| **BR2003-05: Continued** | | | |
| 14585 | PAL | 3 | Dolomitic Mudstone, as above |
| 14584 | PAL | 3 | Dolomitic Mudstone, as above |
| 14583 | PAL | 3 | Dolomitic Mudstone, light-grey weathered, brown fresh, fine-grained, no bioturbation or vugs, sparry calcite |
| 14582 | PAL | 3 | Dolomitic Mudstone, light-grey weathered with brown mottles, medium-grey fresh, fine-grained, extensive network of trace fossils, rust filled vugs |
| 14581 | PAL | 3 | Dolomitic Mudstone, light-grey weathered with brown mottles, medium-grey fresh, fine-grained, extensive network of trace fossils, rust filled vugs, attitude of beds 143°/41° SW |
| **BR2003-06: 4.5 km Southeast of North Saskatchewan River, 750 m west of Dizzy Creek** (UTM 578379, 5803154) | | | |
| - | - | 21¾ | covered |
| 14954 | PAL | 2 | Argillaceous Limestone, tan-grey weathered, black fresh, thin bedding. |
| 14953 | PAL | <2¼ | Packstone, light-grey weathered, medium-grey fresh, fine-grained, nautiloids, brachiopods, crinoids, peloids, trace fossils, rubbly |
| 14952 | PAL | ~2¾ | Packstone, as above |
| 14951 | PAL | ~3½ | Limestone, tan weathered, light-grey fresh, microcrystalline, shaley partings, attitude of beds 123°/38° SW |
| 14600* | PAL | 2 | Mudstone, light-grey weathered and fresh, fine- to very fine grained, chert laminae, rubbly outcrop at top of section, attitude of beds 129°/41° SW |
| 14599 | PAL | 3 | Mudstone, medium-grey weathered, dark-grey-black fresh, very fine to fine-grained, braciopods, chert laminae |
| 14598 | PAL | 3 | Mudstone, light-grey weathered, dark-grey fresh, very fine to fine-grained, calcite stringers, laminated, attitude of beds 120°/42° SW |
| 14597 | PAL | 3 | Mudstone, light-grey weathered, grey fresh, fine-grained |
| 14596 | PAL | 3 | Mudstone, interbedded with brachiopod Wacke-Packstone, light-grey weathered, dark-grey fresh, very fine to fine-grained, chert laminae |
| **BR2003-07: 4.5 km Southeast of North Saskatchewan River, 800 m west of Dizzy Creek** (UTM 578259, 5802882) | | | |
| 14961 | RA | 3 | Mudstone to Grainstone, grey weathered and fresh, very fine grained, crinoids, peloids, few shell fragments |
| 14960 | RA | 2 | Peloidal Wackestone, light-grey weathered, medium-grey fresh, fine-grained, vugs (rusty filled) peloids |
| 14959 | RA | 2 | Wackestone, grey weathered, medium-grey fresh, medium-grained, peloids, attitude of beds 121°/47° SW |
| 14958 | RA | 3 | Mudstone, grey weathered, light-grey fresh, medium-grained, crinoids, peloids. |
| 14957 | RA | 3 | Wackestone to Packstone, grey weathered, medium-grey fresh, medium-grained, peloids, rugose corals, crinoids |
| 14956 | RA | 3 | Grainstone, grey weathered, medium-grey fresh, coarse-grained, crinoids, vugs, rusty fill |
| 14955 | RA | 3 | Mudstone, grey weathered, medium-grey fresh, microcrystalline, vugs, few peloids, attitude of beds 119°/44° SW |

# APPENDIX 2C: DESCRIPTIONS OF THE 2004 STRATIGRAPHIC SECTIONS WITHIN MAIM PERMIT 9302090596, BRAZEAU RANGE

Note: Stratigraphic thicknesses are based on measured attitudes of bedding, as listed below, with appropriate interpolations. Attitudes are strike and dip. UTM coordinates are NAD83. Examined intervals are listed in order from stratigraphic top to bottom.

Abbreviations: Pal - Palliser Formation; Exshaw - Exshaw Formation; Banff - Banff Assemblage; RA - Rundle Assemblage; Fernie - Fernie Formation; Luscar - Luscar Formation

| Sample | Formation Member | Strat. Thick. (m) | Description |
|---|---|---|---|
| **Isolated Samples, Dizzy Creek** | | | |
| 16289 | Luscar | 3 | Siliceous Mudstone, as per 16290 |
| 16290 | Luscar | 3 | Siliceous Mudstone, brown weathered, brown fresh, fine-grained, silty, platy, laminated, attitude of beds 109°/86° N |
| **BR2004-01: Dizzy Creek** | | | |
| 16294 | Fernie | 2½ | Siliceous Mudstone, dark-grey-brown-orange weathered, dark-grey fresh, very fine-grained, beds <10 cm, attitude of beds 113°/23° SW |
| 16293 | Fernie | 3¼ | Siliceous Mudstone, as per 16294, attitude of beds 125°/52° SW |
| 16292 | Fernie | 2¾ | Siliceous Mudstone, as per 16294, attitude of beds 129°/54° SW |
| 16291 | Fernie | 3 | Siliceous Mudstone, as per 16294, attitude of beds 122°/61° SW |
| **Isolated Sample, Dizzy Creek** | | | |
| 16295 | RA | 2 | Dolomitic Mudstone, tan-grey weathered, brown-grey fresh, micritic, beds 15cm, 5cm calcite vein at the top of section, attitude of beds 132°/22° SW |
| **BR2004-02: Dizzy Creek** | | | |
| 16298 | Fernie | 2¾ | Siliceous Mudstone, grey weathered, dark grey fresh, micritic, beds 5cm, platy, attitude of beds 141°/21° SW |
| 16297 | Fernie | 1½ | SIliceous Mudstone, as per 16298 |
| 16296 | Fernie | 2½ | Siliceous Mudstone, as per 16298, attitude of beds 141°/23° SW |
| **BR2004-03: Dizzy Creek, South of section BR2004-02** | | | |
| 16342 | RA | 3 | Grainstone, grey weathered, grey-brown fresh, coarse- to very coarse-grained, peloids |
| 16343 | RA | 3 | Grainstone, as per 16342 |
| 16344 | RA | 3 | Grainstone, as per 16342 |
| 16345 | RA | 3 | Grainstone, as per 16342 |
| 16346 | RA | 5 | Grainstone, as per 16342 |
| **BR2004-04: Dizzy Creek, South of BR2004-03** | | | |
| 16347 | RA | 3 | Wackestone, light-grey weathered, grey-brown fresh, medium-coarse grained, crinoids, bivalves, secondary calcite, thick bedded |
| 16348 | RA | 3 | Wackestone, as per 16347 |
| 16349 | RA | 3 | Wackestone, as per 16347, few calcite nodules, attitude of beds 119°/70° NE |
| 16350 | RA | 3 | Lime Mudstone, grey weathered, dark-grey fresh, fine-grained, coarsens through bottom 1m to wackestone (crinoids) |
| 19351 | RA | 3 | Grainstone, light-grey-tan weathered, brown-grey fresh, coarse-grained, crinoids, peloids, massive, slickensides evidence for deformation |
| 19352 | RA | 3 | Grainstone, grey weathered, brown-grey fresh, coarse-grained, peloids, crinoids, beds <½m, blocky |
| 19353 | RA | 3 | Grainstone, as per 19352 |
| 19354 | RA | 3 | Grainstone, as per 19352 |
| 19355 | RA | 3 | Grainstone, as per 19352, very crumbly |
| 19356 | RA | 3 | Grainstone, grey-weathered, brown fresh, very coarse-grained, crinoids, few peloids, very crumbly, massive, smelly, sandy |

## APPENDIX 2C: CONTINUED

| Sample | Formation Member | Strat. Thick. (m) | Description |
|---|---|---|---|
| **BR2004-04: Continued** | | | |
| 19357 | RA | 3 | Grainstone, grey-weathered, brown fresh, medium- to coarse-grained, crinoids, few peloids, very crumbly, beds >½ m, smelly, sandy |
| 19358 | RA | 4 | Wackestone, grey weathered, grey-brown fresh, medium- to coarse-grained, crinoids, some peloids, beds > 1m, smoother appearance, attitude of beds 127°/76° NE |
| **Isolated Sample near core of Brazeau Anticline** | | | |
| 19359 | Pal | grab | Lime Mudstone, grey-tan weathered, grey fresh, fine- to medium-grained, blocky, beds thick |
| **BR2004-05: 2km west of Fire Tower** | | | |
| 19300 | RA | 1¾ | Grainstone, light-grey weathered, medium-brown-grey fresh, very coarse grained, pellets, rugose corals, crinoids, smelly |
| 19299 | RA | 2¾ | Grainstone, light-grey weathered, medium-brown-grey fresh, medium-grained, pellets, smelly |
| 19298 | RA | 3 | Grainstone, as per 19299 |
| 19297 | RA | 3 | Grainstone, as per 19299 |
| 19296 | RA | 2½ | Grainstone, as per 19299, peloids, brachiopods, crinoids, bryozoans |
| 19295 | RA | 3 | Grainstone, light-grey weathered, light-grey fresh, coarse-grained, pellets, peloids, brachiopods, crinoids, bryozoans, smelly |
| 19294 | RA | 1½ | Grainstone, as per 19295 |
| 19293 | Banff | ½ | Dolomitic Wackestone, brown-grey weathered, medium- to dark-grey fresh, brachiopods, crinoids, bryozoans(?), massive, well fractured, attitude of beds 097°/22° SW |
| 19292 | Banff | 1 | Dolomitic Mudstone, tan weathered, light-grey-brown fresh, micritic- to fine-grained, platy, laminated, beds > 10cm, attitude of beds 116°/26° S |
| **BR2004-06: 2.25km WSW of Fire Tower** | | | |
| 19381 | RA | 2½ | Grainstone, light-tan-grey weathered, medium-grey fresh, medium- to very coarse-grained, colonial corals, rugose corals, crinoids, brachiopods, very well fractured |
| 19380 | RA | 2½ | Grainstone, as per 19381 |
| 19379 | RA | 3 | Grainstone, as per 19381 |
| 19378 | RA | 2½ | Lime Mudstone, medium-grey weathered, dark-grey fresh, micritic, calcite veining, attitude of beds 102°/42° S |
| 19377 | RA | ¼ | Lime Mudstone, light-medium-grey weathered, medium-grey fresh, abundant rectangular/square holes through rock (weathered pyrite/chalcopyrite?) |
| 19376 | RA | ½ | Grainstone, light-tan-grey weathered, dark-grey fresh, coarse-grained, crinoids, brachiopods, pellets, rusty nodules |
| **BR2004-07: 1.25km SW of Fire Tower** | | | |
| 16313 | RA | 2 | Grainstone, grey-weathered, grey-brown fresh, coarse-grained, bivalves, crinoids, pellets, massive, crumbly, calcite filling fractures, platy at top of section |
| 16312 | RA | 3 | Grainstone, as per 16313 |
| 16311 | RA | 3 | Grainstone, as per 16313, less platy |
| 16310 | RA | 3 | Wackestone, light-grey-tan weathered, medium-dark-grey fresh, medium- to coarse-grained, bivalves, occasional crinoids, massive, cleavage 060°/81° N |
| - | - | ¼ | covered |
| 16309 | RA | 2 | Grainstone, grey-brown weathered, grey fresh, coarse-grained, crinoids, bivalves, beds 5-25cm, crumbly, smelly, some secondary calcite, attitude of beds 109°/45° S |
| 16308 | RA | 3 | Lime Mudstone, grey-brown weathered, grey-brown fresh, fine- to coarse-grained, beds ~¼ m, platy sections |

## APPENDIX 2C: CONTINUED

| Sample | Formation Member | Strat. Thick. (m) | Description |
|---|---|---|---|
| **BR2004-08: Peak of Spider Mountain, 600m WSW of Fire Tower** | | | |
| 19291 | RA | 2 | Dolomitic Mudstone to Grainstone, light-grey weathered, medium-grey fresh, crinoids, peloids, brachiopods, rugose corals, beds < 30cm |
| 19290 | RA | 3 | Lime Mudstone, light-grey weathered, medium-grey fresh, micritic, crinoids, brachiopods, beds <½ m, well fractured |
| 19289 | RA | 3½ | Grainstone, light-grey weathered, medium-grey fresh, very coarse-grained, crinoids, brachiopods, beds <½ m, well fractured |
| - | - | 3¼ | covered |
| 19288 | Banff | 3 | Dolomitic Mudstone, light-grey weathered, brownish-grey fresh, micritic to fine-grained, massive, attitude of beds 121°/33° S |
| 19287 | Banff | 3 | Dolomitic Mudstone, tan weathered, dark-grey fresh, very fine grained, well laminated, attitude of beds 122°/40° S |
| 19286 | Banff | 2½ | Dolomitic Mudstone, tan-grey weathered, brownish-grey fresh, very fine grained, laminations, abundant calcite along fractures, attitude of beds 132°/34° SW |
| 19285 | Banff | 1¼ | Siliceous Wackestone, brown-grey weathered, dark-grey fresh, fine-grained, brachiopods, crinoids, bryozoans, attitude of beds 122°/33° SW |
| 19284 | Banff | 3 | Siliceous Mudstone, tan weathered, light- to medium-grey fresh, very fine to medium-grained, thin bedded to massive, calcite along fractures and in veinlets, attitude of beds 123°/33° S |
| 19283 | Banff | 2½ | Siliceous Mudstone, brown-grey-rusty-orange weathered, dark-grey fresh, beds platy, abundant calcite veining, attitude of beds 133°/34° S |
| - | - | 2 | covered |
| 19282 | Banff | 1¼ | Lime Mudstone, light-grey weathered, dark-grey fresh, platy, abundant calcite veining, attitude of beds 117°/28° S |
| 19281 | Banff | 3¼ | Lime Mudstone to Wackestone, brownish-grey weathered, dark-grey fresh, micritic to coarse-grained, brachiopods, attitude of beds 118°/40° S |
| **BR2004-09: 250m South of Spider Mountain** | | | |
| 16319 | RA | 1½ | Wackestone, light-grey weathered, dark-grey fresh, fine- to coarse-grained, pellets, crinoids, bivalves, beds massive |
| 16318 | RA | 3 | Wackestone, light-grey weathered, grey-brown fresh, coarse-grained, crinoids, bivalves, massive |
| 16317 | RA | 3 | Dolomitic Mudstone to Wackestone, light-grey-tan weathered, grey-brown fresh, fine- to coarse-grained, crinoids, pellets, bivalves, thick bedded to massive, fossil content and grain size increase up section, attitude of beds 129°/43° SW |
| - | - | 2 | covered |
| 16316 | RA | 3¼ | Grainstone, light-grey weathered, brown-grey fresh, coarse-grained, pellets, crinoids, bivalves, beds 5-25cm |
| 16315 | RA | 3 | Wackestone, light-grey weathered, grey-brown fresh, medium- to coarse-grained, bivalves, pellets, occasional coral, abundant crinoids, beds ~1m |
| - | - | 2½ | covered |
| 16314 | RA | 2¾ | Wackestone, as per 16315, attitude of beds 102°/31° S |
| **BR2004-10: 300m ESE of Fire Tower** | | | |
| 19280 | Banff | 1 | Wackestone, light-grey weathered, medium- to dark-grey fresh, crinoids, brachiopods, bryozoans, platy-wavy beds, attitude of beds 168°/25 E |
| - | - | - | covered |
| 16303 | Pal | 2¾ | Lime Mudstone, grey weathered and fresh, micritic, some secondary calcite |
| - | - | 3 | covered |
| 19279 | Pal | 2¾ | Lime Mudstone, medium-grey weathered, light-brown-grey fresh, micritic, massive, attitude of beds 165°/17° E |
| 19278 | Pal | 2¾ | Lime Mudstone, as per 19279 |

## APPENDIX 2C: CONTINUED

| Sample | Formation Member | Strat. Thick. (m) | Description |
|---|---|---|---|
| **BR2004-10: Continued** | | | |
| 19277 | Pal | 2½ | Dolomitic Mudstone, dark-grey-rusty weathered, medium-grey-tan fresh, micritic to fine-grained, beds 2-40cm, laminated, attitude of beds 028°/10° E |
| 19276 | Pal | 2 | Dolomitic Mudstone, as per 19277, attitude of beds 025°/10° E |
| - | - | 5¼ | covered |
| 16302 | Pal | 1 | Wackestone, yellow-grey weathered, dark-grey fresh, micritic, brachiopods, algal mats(stroms?) |
| 16301 | Pal | 3 | Wackestone, as per 16302 |
| 16300 | Pal | 3 | Dolomite, dark-grey-orange weathered, medium grey-brown fresh, fine-grained, beds < 10cm, well laminated, organic staining |
| 16299 | Pal | 1½ | Dolomitic Mudstone, dark-grey weathered, dark-grey fresh, fine-grained, thick bedded to massive, attitude of beds 038°/20° SE |
| **BR2004-11: 500m West of Ram Mountain** | | | |
| 16341 | RA | ¾ | Dolomitic Mudstone, light-medium-grey weathered, dark-grey fresh, few crinoids, attitude of beds 110°/31° W |
| - | - | 1 | covered |
| 16340 | RA | 1¼ | Dolomitic Mudstone, as per 16341 |
| - | - | 1 | covered |
| 16339 | RA | 2 | Dolomitic Mudstone to Wackestone, light-grey-brown weathered, medium-grey-brown fresh, fine- to medium-grained, crinoids |
| 16338 | RA | 3 | Dolomitic Grainstone, medium-grey weathered, medium-grey fresh, crinoids, peloids |
| 16337 | RA | 3 | Dolomitic Grainstone, light-grey weathered, grey-brown fresh, coarse-grained, peloids, blocky, crumbly, some secondary calcite |
| 16336 | RA | 3 | Grainstone, light-grey weathered, grey-tan fresh, coarse-grained, crinoids, pellets, beds >¼ m, platy, very crumbly, smelly, attitude of beds 106°/22° S |
| 16335 | RA | 3 | Grainstone, as per 16336 |
| 16334 | RA | 2½ | Grainstone, as per 16336 |
| - | - | 5 | covered |
| 16333 | Banff | 1½ | Dolomitic Mudstone, light-tan-brown weathered, grey fresh, micritic, platy, wavy bedding |
| **BR2004-12: Ram Mountain, 700m West of Sheeptrap Mountain** | | | |
| 16332 | RA | 1 | Dolomitic Mudstone, light-grey weathered, grey fresh, fine-grained, scattered outcrops at top of section |
| 16331 | RA | 3 | Wackestone, light-grey weathered, grey-brown fresh, coarse-grained, pellets, few crinoids, secondary calcite, vertical fractures, wavy beds |
| - | - | 2¼ | covered |
| 16330 | RA | 1¾ | Wackestone, light-grey weathered, grey-brown fresh, coarse-grained, pellets, few crinoids, secondary calcite, vertical fractures |
| 16329 | RA | 2½ | Wackestone, as per 16330 |
| 16328 | RA | 3 | Wackestone, as per 16330 |
| - | - | 1 | covered |
| 16327 | RA | 3 | Dolomitic Wackestone, light-grey weathered, grey-brown fresh, medium-grained, rugose and colonial corals, crinoids, pellets, beds 10cm, vertical fractures, smelly |
| - | - | 1 | covered |
| 16326 | RA | 1¼ | Dolomitic Wackestone, light-grey weathered, medium-grey fresh, fine-grained, large rugose corals, beds > ¼ m, attitude of beds 107°/10° S |
| - | - | 1¾ | covered |
| 16325 | RA | 2 | Dolomitic Mudstone, light-grey weathered, medium-grey fresh, micritic to fine-grained, occasional crinoid, rugose corals, beds ¼ - ½ m |
| - | - | 2 | covered |

# APPENDIX 2C: CONTINUED

| Sample | Formation Member | Strat. Thick. (m) | Description |
|---|---|---|---|
| **BR2004-12: Continued** | | | |
| 16324 | RA | 2 | Dolomitic Mudstone, light-grey weathered, medium-grey fresh, medium-grained, massive |
| - | - | 1½ | covered |
| 16323 | RA | 3 | Lime Mudstone, light-grey weathered, medium-grey fresh, medium- to coarse-grained, massive |
| 16322 | RA | 2¼ | Lime Mudstone, as per 16323 |
| 16321 | Banff | 2 | Dolomitic Mudstone, tan-grey weathered, tan-grey fresh, micritic, thick bedded, wavy, fractured, attitudes of beds 115°/29° SW |
| 16320 | Banff | 2 | Wackestone, grey-brown weathered, grey fresh, micritic, bivalves, crinoids, beds < 5cm, calcite nodules, iron staining |
| **BR2004-13: 300m North of Sheeptrap Mountain** | | | |
| 16261 | RA | 2½ | Lime Mudstone, light-grey weathered, dark-grey fresh, micritic, massive, blocky, secondary calcite |
| 16260 | RA | 2 | Dolomitic Mustone, grey weathered, grey-brown fresh, micritic, occasional bivalve, thick bedded to massive, fractured appearance, fetid odour |
| 16259 | RA | 2 | Wackestone, light-grey weathered, grey-black fresh, medium- to coarse-grained at the top, crinoids, black bitumen, thick bedded to massive |
| 16258 | RA | 3½ | Lime Mudstone, light-grey weathered, purple-grey fresh, micritic to fine-grained, pellets, crinoids |
| 16257 | RA | 2¾ | Lime Mudstone, light-grey weathered, grey-brown fresh, micritic with occasional coarse-grained beds, crinoids, corals, thick bedded to massive |
| - | - | 1½ | covered |
| 16256 | RA | 3¼ | Wackestone, grey weathered and fresh, micritic to medium-grained, large corals, beds >10cm, calcite veining, joints 096°/69° S, thin fossil bed with crinoids near top, attitude of beds 005°/19° E |
| - | - | 14½ | covered |
| 16255 | RA | 2 | Wackestone, grey weathered and fresh, coarse- to very coarse grained, beds >½m, massive, purplish hue, attitude of beds 016°/06° E |
| 16254 | RA | 3½ | Wackestone, as per 16255 |
| 16253 | RA | 2¾ | Lime Mudstone, light-grey weathered, grey fresh, micritic, calcite veining, pellets, gastropods, beds < 5cm, platy, top ¼m Wackestone |
| 16252 | RA | 2¾ | Dolomitic Mudstone, grey-tan weathered, grey-brown fresh, micritic, beds <½m, attitude of beds 172°/11° E |
| 16251 | RA | 3½ | Dolomitic Mudstone, grey-tan weathered, grey-brown fresh, micritic, beds < 15cm, attitude of beds 164°/12° E |
| **BR2004-14: Peak of Sheeptrap Mountain** | | | |
| 16282 | RA | 5 | Lime Mudstone, light- to medium-grey weathered, light- to very dark grey fresh, micritic to medium-grained, beds 10cm to 2m |
| - | - | 7½ | covered |
| 16281 | RA | 2 | Siliceous Mudstone, light-grey weathered, dark-grey fresh, very fine grained, well laminated, fetid odour, attitude of beds 052°/19° SE |
| - | - | 2 | covered |
| 16280 | RA | 3 | Dolomitic Mudstone, very light grey weathered, light- to medium-grey fresh, fine-grained, brachiopods, fractured, silicification |
| - | - | 7½ | covered |
| 16279 | RA | 1½ | covered |
| 16278 | RA | 1½ | Dolomitic Mudstone, as per 16280 |
| 16277 | RA | 3 | Dolomitic Mudstone, as per 16280 |
| 16276 | RA | 2 | Dolomitic Wackestone, light-grey weathered, medium-grey fresh, very fine grained, brachiopods, rugose corals, mottled, dolomitized pockets, chert present |

## APPENDIX 2C: CONTINUED

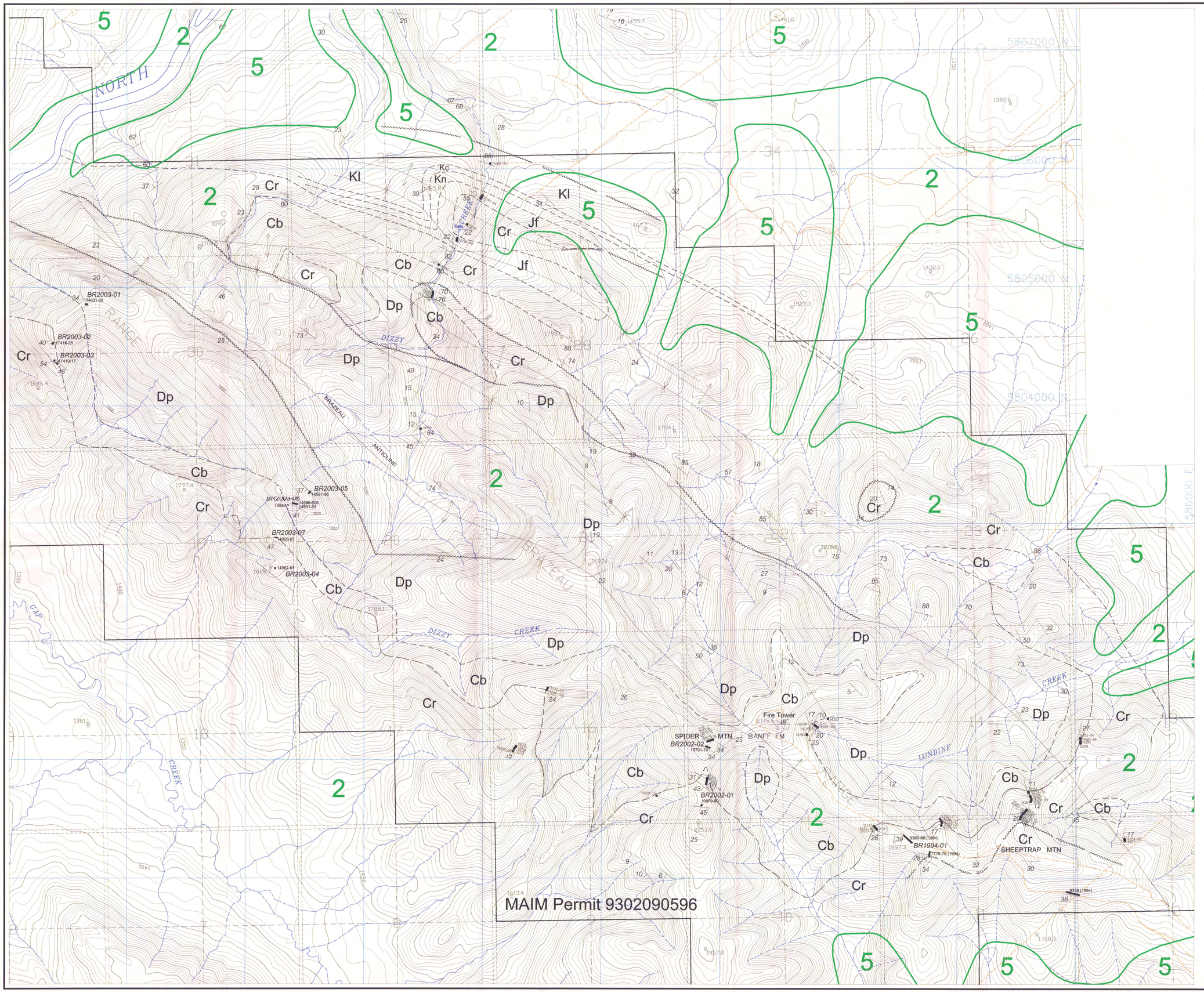
| Sample | Formation Member | Strat. Thick. (m) | Description |
|---|---|---|---|
| **BR2004-14: Continued** | | | |
| - | - | 3 | covered |
| 16275 | RA | ¾ | Dolomitic Wackestone, as per 16276 |
| 16274 | RA | 3 | Dolomitic Wackestone,as per 16276 |
| 16273 | RA | 3 | Dolomitic Wackestone, light-grey weathered, light-brown-grey fresh, very fine grained, crinoids, rugose corals, well laminated, mottled, dolomitized pockets, attitude of beds 085°/20° S |
| 16272 | RA | 4* | Dolomitic Wackestone, as per 16273 |
| 16271 | RA | 4* | Dolomitic Wackestone, as per 16273 |
| 16270 | RA | 4* | Dolomitic Mudstone, light-grey weathered, light-brown-grey fresh, very fine grained, well-laminated beds, mottled |
| 16269 | RA | 3 | Dolomitic Wackestone, light-grey weathered, grey-brown fresh, micritic, bivalves, crinoids, leached "holey" weathering, chalky on fresh surface |
| - | - | 2 | covered |
| 16268 | RA | 2 | Dolomitic Mudstone, light-grey weathered, grey-brown fresh, coarse-grained, occasional crinoid, rugose coral, very fractured, blocky |
| 16267 | RA | 3 | Lime Mudstone, as per 16268 |
| 16266 | RA | 3 | Lime Mudstone, light-grey-tan weathered, grey-brown fresh, fine- to medium-grained, occasional rugose coral, massive beds, fractured, blocky |
| 16265 | RA | 2¾ | Lime Mudstone, light-grey weathered, grey fresh, fine- to coarse-grained, black pellets, bitumen(?), thick bedded to massive |
| 16264 | RA | 1¾ | Lime Mudstone, dark-grey weathered, dark-grey fresh, micritic, well laminated, fractured |
| 16263 | RA | 1 | Breccia, orange-tan matrix, dark-grey TV clasts, chert nodules, calcite crystals |
| 16262 | RA | 3½ | Siliceous Mudstone, orange-grey weathered, dark-grey fresh, micritic, fractured, iron staining, strongly weathered along fracture planes, chert nodules at top, attitude of beds 073°/20° S |
| **BR2004-15: 750m NE of Sheeptrap Mountain** | | | |
| 16288 | RA | 1¾ | Lime Mudstone, light-grey weathered, medium- to dark-grey fresh, medium- to coarse-grained, beds ~30cm, fractured, attitude of beds 005°/27° E |
| - | - | ½ | covered |
| 16287 | RA | 1¾ | Lime Mudstone, light-grey weathered, medium-grey fresh, medium-grained, massive |
| 16286 | RA | 2½ | Wackestone, light- to medium grey weathered, medium- to dark-grey fresh, coarse-grained, pellets, crinoids, massive |
| 16285 | RA | 3¾ | Wackestone, as per 16286, attitude of beds 015°/21° E |
| 16284 | RA | 2¼ | Lime Mudstone, medium-grey weathered, medium- to dark-grey fresh, medium- to coarse-grained, occasional rugose |
| - | - | 1¼ | covered |
| 16283 | RA | 1¼ | Wackestone, medium-grey weathered, medium-grey fresh, coarse-grained, crinoids, rugose corals, beds ~20cm, attitude of beds 016°/36° E |
| | RA | 10 | Inaccessible |
| **BR2004-16: 900m East of Sheeptrap Mountain** | | | |
| 16307 | RA | 3½ | Lime Mudstone to Wackestone, light-grey weathered, grey-brown fresh, fine-grained, rugose corals, brachiopods, beds massive, smelly |
| - | - | 2 | covered |
| 16306 | RA | 1½ | Lime Mudstone, grey weathered, grey-brown fresh, micritic, chunks of calcite, occasional crinoids, black chert nodules |
| 16305 | RA | ½ | Siliceous Mudstone, orange-grey weathered, grey fresh, micritic, platy, laminated, wavy beds |
| 16304 | RA | 1½ | Lime Mudstone, grey weathered, grey-brown fresh, micritic, chunks of calcite, occasional crinoids, black chert nodules, attitude of beds 019°/17° SE, attitude of joints 115°/81° NE |

# APPENDIX 3: STATEMENT OF QUALIFICATIONS

The field work described in this report was supervised by Jody Dahrouge.

J.R. Dahrouge is a geological consultant with Dahrouge Geological Consulting Ltd. based in Edmonton, Alberta. He obtained degrees in geology and computing science from the University of Alberta, Edmonton in 1988 and 1994, respectively. He has more than 10 years of experience in mineral exploration. He is a member of the Canadian Institute of Mining and Metallurgy and is registered as P. Geol. with the Association of Professional Engineers, Geologists, and Geophysicists of Alberta.

R. Wolbaum is a geological consultant with Dahrouge Geological Consulting Ltd. based in Edmonton, Alberta. She obtained a degree in geology from the University of Alberta, Edmonton in 2003 and has been employed in the mineral exploration industry since. She is registered as a Geol. I.T. with the Association of Professional Engineers, Geologists, and Geophysicists of Alberta.




Approximate Mean Declination 2002

0°56'

17°24'

## LEGEND AND SYMBOLS

LOWER CRETACEOUS

- Kl — Luscar Formation: carbonaceous shale, sandstone, coal seams
- Kc — Cadomin Formation: chert and quartz-pebble conglomerate
- Kn — Nikanassin Formation: light-grey and black sandstone, shale; coal stringers

JURASSIC

- Jf — Fernie Formation: shale, sandstone, carbonates

CARBONIFEROUS

Rundle Group

- Cr — Turner Valley, Shunda, and Pekisko formations: Undivided
- Cb — Banff Formation: argillaceous and cherty limestone, fissile and calcareous shale

DEVONIAN

- Dp — Palliser Formation: massive mottled limestone and dolomite, porous and vuggy dolomite, argillaceous limestone
- Da — Alexo Formation: silty dolomite, sandstone, dolomite breccia
- Dm — Mount Hawk Formation: brown cherty dolomite, dark grey argillaceous limestone

- Geological boundary
- Bedding (inclined, vertical, overturned, horizontal)
- Fault
- Synclinal axis (arrow indicates plunge)
- Anticlinal axis (arrow indicates plunge)
- Sample section with sample numbers — 97-12 / 9755-57
- Isolated sample with sample number — 11551
- Location of cross-section — B — B'
- Elevation contour (interval: 10 m) — 1450
- Highway with number — 11
- Gravel road
- Trail or cut line
- MAIM Permit — 9302090596
- Land Use Zone Boundary; Zone Number — 2

2 Critical Wildlife
4 General Recreation
5 Multiple Use
8 Facility

NOTES

1) Base map compiled from 1 : 20 000 scale digital base maps 83B/SNW,SW, and SE supplied by Spatial Data Warehouse Ltd., Calgary, Alberta.
2) Geology modified after Erdman (1950), Douglas (1956, 1958), and Holter (1976).
3) UTM grid is based on North American Datum, 1983 (NAD83); UTM grid zone: 11U.
4) To accompany Assessment Report entitled "2004 Exploration and Fieldwork at the Brazeau Range Metallic and Insutrial Minerals Permit, West-Central Alberta" by J.R. Dahrouge and R. Wolbaum (2004/12/20).

| REVISIONS | |
|---|---|
| BY | DATE |
| WM | 2003.09 |
| WM | 2004.03 |
| WM | 2004.06 |
| WM | 2004.12 |

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DAHROUGE GEOLOGICAL CONSULTING LTD.
Edmonton, Alberta

WEST-CENTRAL ALBERTA

Fig. 6.1
Geology and Locations of Sections Along the Southern Part of Brazeau Range

0 200 400 600 800 1000 m
Scale

WM 2003.08