

# MAR 20080005: BRAZEAU RANGE

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20080005  
MAR 13 2008

**GRAYMONT WESTERN CANADA INC.**  
**2007 EXPLORATION AND FIELDWORK**  
**WITHIN THE BRAZEAU RANGE**  
**METALLIC AND INDUSTRIAL MINERALS PERMITS,**  
**WEST-CENTRAL ALBERTA**

**PART B**

Metallic and Industrial Mineral Permits  
9396010038 and 9302090596

Geographic Coordinates

52°23' N to 52°33' N  
115°53' W to 116°14' W

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

Owner of MAIM Permits 9396010038 and 9302090596  
Graymont Western Canada Inc.  
190, 3025 - 12 Street N.E.  
Calgary, AB, T2E 7J2

Operator: Graymont Western Canada Inc.  
190, 3025 - 12 Street N.E.  
Calgary, AB, T2E 7J2

Consultant: Dahrouge Geological Consulting Ltd.  
18, 10509 - 81 Avenue  
Edmonton, Alberta T6E 1X7

Authors: P. Kluczny, B.Sc., Geol. I.T.  
J. Tanton, B.Sc., P.Geol.

Date Submitted: March 14, 2008

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**1.****SUMMARY**

Between October 23<sup>rd</sup> and November 7<sup>th</sup>, 2007, the northern part of Brazeau Range, north of Nordegg and within Metallic and Industrial Mineral (MAIM) Permit 9396010038, was explored for high-quality carbonate rocks. In total, three diamond drill holes were completed, totaling 270.66 metres. Challenging drilling conditions and a relatively inexperienced crew resulted in many problems, which inflated the drill costs.

The drill holes were located in order to test the thickness and quality of carbonate rocks within Devonian to Carboniferous stratigraphic units of the Brazeau Range. The target formations of this drill program were the Devonian Palliser Formation, and the Mississippian Pekisko and Turner Valley formations. Samples were obtained and sent to a laboratory for whole-rock analysis.

The Palliser Formation appears to have little potential for either high-calcium limestone or high-quality dolomite, due to variable contents of  $MgCO_3$  and  $CaCO_3$ . In total, approximately 80 metres of the Palliser were tested. The Pekisko Formation appears to have good potential for high-calcium limestone due to consistently low concentrations of silica. In total, approximately 30 metres were examined and sampled. The Turner Valley Formation has low potential for high-calcium limestone, but has consistently high dolomite content, and therefore high potential for high-quality dolomite. In total, approximately 50 metres were examined and sampled.

As a previous assessment report (Pana and Dahrouge, 1998) includes detailed descriptions of geographic setting, history and previous investigations, the majority of that information is not repeated herein. No work was performed on MAIM Permit 9302090596. It is included for grouping purposes only and will not be described in detail in this report.

**2.****INTRODUCTION**

During the fall of 2007, Dahrouge Geological Consulting Ltd. on behalf of Graymont Western Canada Inc. conducted exploration for high-quality carbonate lithotypes within west-central Alberta. This assessment report describes the exploration conducted within MAIM Permit 9396010038, which encompasses the northern parts of Brazeau Range of the Alberta Foothills. It includes information on the geology and quality of carbonates intersected by 3 diamond drill holes completed during October 23<sup>rd</sup> to November 7<sup>th</sup>, as well as an interpretation of the results. Bob Robison, exploration manager for Graymont Western U.S. Inc., authorized this work.

### 3. GEOGRAPHIC SETTING AND ACCESS

MAIM permit 9396010038 encompasses the northern part of Brazeau Range near Nordegg, Alberta. Nordegg, with year-round facilities, is located 85 km west of Rocky Mountain House on Highway 11 (Fig. 3.1).

The southern part of MAIM Permit 9396010038 is accessible via Forestry Trunk Road 734 which branches south and north from Highway 11, just west of Nordegg. North of North Saskatchewan River an ATV trail that branches from the Forestry Trunk Road follows the river easterly towards Dipslope Mountain. The area south of Highway 11 can also be accessed by heading south along the main street of Nordegg, which adjoins with a new lease road that leads to Eagle Ridge. The northern part of MAIM Permit 9396010038 is accessed by traveling 12 km north from Highway 11 along Forestry Trunk Road 734. Logging roads and cut blocks provide access to Shunda Mountain (Fig. 4.2). Access to and throughout the property is by four-wheel-drive vehicle, all-terrain vehicle, or by foot.

Climate is sub-alpine with average summer temperatures of 20° to 25°C and winter temperatures of -15° to -20°C, with extremes of 30°C and -40°C. Rainfall averages about 35 cm per year with maximum snowfall in December and January which averages 35 to 45 cm.

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 METALLIC AND INDUSTRIAL MINERALS PERMIT 9396010038

In early 1996, Graymont Western Canada Inc. (nee: Continental Lime Ltd.) acquired Metallic and Industrial Minerals (MAIM) permit 9396010038 to cover Paleozoic limestones near Nordegg, Alberta (Table 4.1 and Fig. 4.1). The permit is divided into two parts by quarrying leases, and by Land Use Zones 4 and 8, as designated by the Alberta Eastern Slopes Policy (Alberta Forestry, Lands, and Wildlife, 1988).

The reduced area of MAIM permit 9396010038 is 3,218 hectares (Fig. 4.1). The permit was reduced based on the exploration completed between 1994 and 1997 (Pana and Dahrouge, 1998). Given exploration expenditures of \$134,579.23 for 2007 (Appendix 1, Section 4.4), the entirety of MAIM permit 9396010038 will be retained for the remainder of its permit term (Table 4.1). Excess expenditures will be applied to MAIM permit 9302090596.

#### 4.2 METALLIC AND INDUSTRIAL MINERALS PERMIT 9302090596

MAIM Permit 9302090596 was acquired by Graymont Western Canada Inc. in late 2002 to cover additional Paleozoic limestones in the Brazeau Range south of Nordegg.

The reduced area of MAIM permit 9302090596 is 5,056 hectares (Fig. 4.1). The permit was reduced in 2006, based on exploration completed earlier that year (Dahrouge and Tanton, 2006). The entirety of MAIM permit 9302090596 will be retained.

**TABLE 4.1 DESCRIPTION OF METALLIC AND INDUSTRIAL MINERALS PERMIT 9396010038**

Record Date	Expiry Date	Land Description (Tp-RW5)	Size (Ha)
<b>Permit Area (Fig. 4.2)</b>			
Jan. 17, 1996	Mar. 17, 2006	39-14W5 (Sections: 35NE,L7,L8)	3218
		40-14W5 (Sections: 2SE,NW,L3,L5,L6,L10,L15; 10SE,NW, L3,L5,L6,L9,L10,L15; 11L3,L4; 15L3,L4,L5; 16NW,L5,L6,L7,L8,L9,L10,L15; 17L7,L8,L9,L16; 19N; 20NW,L1,L2,L7,L10,L15; 30L2,L3)	
		40-15W5 (Sections: 24L9,L16; 25L1,L5,L6,L7,L8,L9S, L10S; 26L6P*,L7,L8)	
		41-15W5 (Sections: 3L2,L3,L4P°,L5,L6,L7,L11,L12,L13; 4L9,L13,L14,L15,L16; 5L16; 7NE,L8,L14; 8S,L10,L11,L12; 9S,10L4,L5; 18S,L11,L12,L16; 19SE,L9,L10,L13,L14,L15; 30L4)	
		41-16W5 (Sections: 13NW,L1,L6,L7,L8,L9,L10,L15; 23L1,L8,L9,L14,L15,L16; 24SW,N,L2,L7,L8; 25SW,L1,L2,L7,L11,L12; 26S,L9,L10,L11,L12; 27SE,L9,L10)	

\* Part lying outside land use zone 8

° Part lying outside land use zone 4

**TABLE 4.2 DESCRIPTION OF METALLIC AND INDUSTRIAL MINERALS PERMIT 9302090596**

Record Date	Expiry Date	Land Description (Tp-RW5)	Size (Ha)
Permit Area (Fig. 4.2) Sept. 4, 2002	Sept. 4, 2008	39-13 W5: 9L14, L15; 10NE, L11, L13, L14; 11L13-L16; 12L13, L14; 13W; 14-16; 17NE, L7, L8, L14; 19NE, L7, L8, L11, L13, L14; 20-22; 23S, NW, L9, L10, L15; 27SW; 28S, L10-L13; 29; 30; 31S; 32L1-L5; and  39-14 W5: 24L15, L16; 25N, SE, L6; 36NW, L1-L3, L8; and  40-14 W5: 1L4, L5, L12; 2L9, L16; 11L1, L2, L5-L7, L11-L13; 15NW, L1, L2, L6, L7; 16L16; 20L16; 21NW, SE, L3, L5, L6, L10; 22L4; 28L3-L5; 29; 30N, L1, L4-L8; 31SE, L3, L4, L9, L10; 32SW, L2.	5120

#### 4.3 2007 EXPLORATION

The work described herein was undertaken to determine the thickness and quality of carbonate units within easily accessible areas of MAIM Permit 9396010038.

Between October 23<sup>rd</sup> and November 7<sup>th</sup>, 2007, three diamond drill holes were completed by White Bear Mining Services on MAIM Permit 9396010038 (Fig 4.2). The supervision of the drill program and geological logging were performed by Dahrouge Geological, on behalf of Graymont Western Canada Inc. The locations and details of each drill hole are presented in Table 4.3.

Geological observations of the drill core were recorded in diamond drill logs, including lithologic information, measurements of structural elements, and other pertinent details (Appendix 2). The core was split and a total of 134 samples were collected and sent for analyses. Assays were completed by the Central Analytical Laboratory of Graymont Western U.S. Inc. based out of Salt Lake City, Utah, USA (Appendices 2 and 3); details of the analytical procedure are provided in Appendix 4. The drill core is currently stored at a private warehouse in Stony Plain, AB.

Transportation between Nordegg and the property was by a rented four-wheel-drive truck. All of the drill equipment was delivered to the site on a flat deck trailer, and was unloaded/moved to drill sites by a contracted D6 Bulldozer.

**TABLE 4.3** 2007 DIAMOND DRILL HOLES

Drill Hole	Easting* (m)	Northing* (m)	Elevation (m)	Casing Depth (m)	Total Depth (m)
N07-01	560350	5818158	1466	6.1	78.33
N07-02	560359	5818793	1477	4.57	98.76
N07-03	560431	5817783	1430	6.1	93.57
				<b>Total:</b>	270.66

\* Coordinates are UTM NAD83 (Zone 11N)

#### 4.4 EXPLORATION EXPENDITURES

During 2005 to 2006, exploration expenditures for MAIM Permit 9396010038 totaled \$44,777.73, which resulted in an excess credit of \$12,734.73, allocated to the assessment period 'Years 11 and 12'. Expenditures for 2007 were \$134,579.23 (Appendix 1); therefore, total available assessment credits are \$147,313.96. Expenditures are allocated to MAIM permit 9396010038 as follows:

Assessment Period MAIM Permit 9396010038	Expiry Date	Required Expenditures	Assigned Expenditures
Years 11 and 12	Jan. 17, 2008	\$48,270	\$48,270
Years 13 and 14	Jan. 17, 2010	\$48,270	\$48,270

For MAIM Permit 9302090596, 2005 to 2006 exploration expenditures totaled \$69,750.80, which resulted in an excess credit of \$21,905.80, allocated to the assessment period 'Years 5 and 6'. Expenditures for 2007 are \$134,579.23, minus the \$83,805.27 (2007 expenditures) assigned to MAIM Permit 9396010038; therefore, total available assessment credits are \$72,679.76. An excess credit of \$22,119.76 will be applied to years 7 and 8. Expenditures are allocated to MAIM permit 9302090596 as follows:

Assessment Period MAIM Permit 9302090596	Expiry Date	Required Expenditures	Assigned Expenditures
Years 5 and 6	Sept. 04, 2008	\$50,560	\$50,560
Years 7 and 8	Sept. 04, 2010	\$75,840	\$22,120

## 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). The Palliser Formation, at both Exshaw and Cadomin, supplies limestone for the manufacturing of cement (Holter, 1994).

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 the Front Ranges of the Rocky Mountains, the Upper Devonian Fairholme Group was transgressively 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 Lower to Middle Famennian 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, 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 the 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 Formation.

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

System or Subsystem	Stratigraphic Unit		
	Assemblage Group	Formation	
		S <span style="float: right;">N</span>	
Lower Carboniferous	Rundle Assemblage	Mount Head	
		Turner Valley	
		<sup>1</sup> Livingstone	Shunda
			Pekisko
	Banff Assemblage	Banff	
		Exshaw	
Upper Devonian		<sup>1</sup> Palliser	
		Alexo	
	Fairholme Group	Southesk	Mounthawk
		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).

<sup>1</sup>Current limestone production (from Holter, 1994)

### 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 an euxinic basin to shallow-neritic environment. In general, the Lower to Upper Tournaisian Banff Formation unconformably overlies the Exshaw. The Banff Formation 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 are 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.

## 6. PERMIT GEOLOGY

### 6.1 DRILL HOLE SUMMARY

Carbonate lithologies of the Palliser Formation, Banff Assemblage and Rundle Assemblage were intersected in the drill holes, which were all located north of Highway 11 (Fig. 4.2). The holes were oriented and inclined to maximize the stratigraphic thickness intersected. Hole 2 was drilled vertically, as it was located in order to test the near-surface quality of the Palliser Formation.

The following intersections are approximate due to variations in the inferred bedding orientations. They are summarized as a cross-section in Fig. 6.1. Hole 1 intersected the lowermost

10 metres of Shunda Formation, 37 metres of the Pekisko Formation, and the uppermost 20 metres of the Banff Formation. Hole 2 intersected the lowermost 10 metres of the Exshaw Formation and the uppermost 75 metres of the Palliser Formation. Hole 3 intersected the lowermost 50 metres of the Turner Valley Formation and the uppermost 36 metres of the Shunda Formation.

## 6.2 STRATIGRAPHY

The Palliser Formation was intersected in Hole 2; the uppermost 25 m consists of dolomite mottled lime mudstone to wackestone. This is underlain by 30 m of variably rubbly/poorly consolidated calcareous dolomitic mudstone and then 18 m of vuggy calcareous dolomitic mudstone. Only the uppermost unit was examined in the last exploration program (Dahrouge and Tanton, 2006).

The Palliser Formation is overlain by the Banff Assemblage, which was intersected in holes 1 and 2. In Hole 2, 10 m of Exshaw Formation were intersected at the beginning of the hole, directly overlying the Palliser Formation. It consists of dark, well-bedded shale and calcareous shale. In Hole 1, 23 m of Banff Formation were intersected at the end of the hole. It consists of interbedded dolomitic mudstone and carbonaceous dolomitic lime mudstone. According to Pana and Dahrouge (1998), the Banff Formation consists of a lower recessive unit of calcareous shales and cherty argillaceous limestone, 83 m thick at Shunda Creek Gap, and an upper resistant unit of fine-grained, medium-bedded, limestone and dolomite with crinoid remnants, 91 m thick on Coliseum Mountain (Douglas, 1956).

All three of the formations within the overlying Rundle Assemblage were identified during the drill program. The full 37 m thickness of the basal unit, the Pekisko Formation, was intersected in Hole 1. It consists of a lower bioclast-rich lime grainstone unit and an upper dolomitic lime wackestone to packstone unit with abundant secondary dolomite. This unit is overlain by the Shunda Formation, which was intersected in holes 1 and 3. In Hole 1, the lowermost 10 m was identified and consists of brecciated dolomitic lime mudstone to wackestone. The uppermost 37 m of the Shunda Formation was intersected in Hole 3, and consists of brecciated and altered lime mudstone with siliceous and/or dolomitic mudstone to siltstone interbeds. The Shunda Formation is overlain by the Turner Valley Formation, which was identified in Hole 3. The lowermost 50 m of Turner Valley Formation encountered consists of weakly to moderately carbonaceous, vuggy dolomitic mudstone to sandstone with minor chert interbeds.

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 from Brazeau Range vary from 30 to 50 metres (Dahrouge and Tanton, 2006). The inferred outcrop extent of the Pekisko Formation within the project area is shown in Fig. 4.2.

### 6.3 STRUCTURE

As previously indicated by Pana and Dahrouge (1998; p. 11),

"North of Nordegg the main structural elements within Brazeau Range include Brazeau Anticline, and Coliseum Fault, which is a splay from the Brazeau Thrust... North of Highway 11 the asymmetrical Brazeau Anticline trends northwesterly; one limb dips gently to moderately to the southwest and the other steeply northeast to overturned. Local faults and folds are present on both limbs. ...

The main structural elements southeast of Nordegg are the same as those north of Highway 11, namely Brazeau Anticline and splays from Brazeau Thrust. Although mostly asymmetrical near Storm Mountain,... parts of the Brazeau Anticline are symmetrical with dip slopes of 23° to 38° in the southwest limb that decrease to the west. Steep dip-slopes are present at lower elevations in the northeast limb. Erdman (1950) mapped a second order northwest-trending syncline and a northwest-trending anticline within the northeast limb. Southeasterly to North Saskatchewan River the southwest limb forms dip slopes with moderate dips at higher elevations, particularly on Dipslope Mountain, and gentler dips at lower elevations."

## 7. RESULTS

Analytical results of drill core samples identified high-quality zones of both dolomite and limestone within the permit (Appendices 2 and 3). Analytical results of the Palliser Formation were highly variable, ranging from 50-96% CaCO<sub>3</sub>, 1-43% MgCO<sub>3</sub>, and 1-10% SiO<sub>2</sub>. The dolomite content was greater than expected, and is most likely at least partly secondary. The silica values were not as variable, consistently between 1-3%, which is around the cut-off level for high-calcium limestone/dolomite.

Samples from the Banff and Exshaw formations were generally high in silica and/or dolomite, with low to moderate CaCO<sub>3</sub> values.

Samples from the Rundle Assemblage varied greatly in quality. The Pekisko Formation was generally high quality, with less than 1.7% SiO<sub>2</sub> throughout. The dolomite content was somewhat variable and ranged from 32% to less than 1%; the variability is likely caused by secondary

dolomite. The Shunda Formation was overall poor to moderate quality with values of 35-96%  $\text{CaCO}_3$ , 1-30%  $\text{MgCO}_3$ , and 1-24%  $\text{SiO}_2$ . The overlying Turner Valley Formation returned excellent dolomite values; they ranged from 36-45%  $\text{MgCO}_3$  over the entire thickness.

## 8. CONCLUSIONS

Within the northern part of MAIM Permit 9396010038, intervals of the Palliser Formation, Banff Assemblage and Rundle Assemblage were tested by employing a diamond drill program. A total of 3 diamond drill holes were completed with a total depth of 270.66 m, representing a total stratigraphic thickness of approximately 230 metres.

Carbonate intervals within the upper parts of the Palliser Formation were examined in one of the drill holes. The upper part of the Palliser Formation is comprised of dolomite mottled lime mudstone to wackestone that becomes increasingly dolomitic and less consolidated with depth. The Palliser has low potential for either high-quality limestone or dolomite, as assay results revealed highly variable levels of  $\text{MgCO}_3$  and  $\text{CaCO}_3$ .

The Banff Assemblage was intersected in multiple drill holes and consists of a lower unit (Exshaw Formation) of dark, well-bedded shale and calcareous shale and an upper unit (Banff Formation) of interbedded dolomitic mudstone and carbonaceous dolomitic lime mudstone. Both units have  $\text{CaCO}_3$  values too low and  $\text{SiO}_2$  values too high to be considered potential sources of high-calcium limestone. The dolomite content was highly variable.

The Rundle Assemblage was also intersected in multiple drill holes. The lowermost unit, the Pekisko Formation, consists of a lower bioclast-rich lime grainstone unit and an upper dolomitic lime wackestone to packstone. It represents the greatest potential for high-calcium limestone, as  $\text{SiO}_2$  values were below 2% over the entire thickness. The only concern would be the variable amounts of (secondary) dolomite. The middle unit, the Shunda Formation, consists of variably dolomitic lime mudstone to wackestone. This unit has low potential for high-quality limestone/dolomite, as the  $\text{SiO}_2$  values averaged too high over its sampled thickness. The uppermost unit, the Turner Valley Formation, consists of dolomitic mudstone to sandstone. This unit has the greatest potential for high-quality dolomite, as assay results ranged from 36-45%  $\text{MgCO}_3$  over its sampled thickness.

The presence of high-calcium limestone and high-quality dolomite within MAIM Permit 9396010038 warrants the conversion of the permit to a lease. This land should be protected in order to further develop the potential for a high-quality carbonate quarry.

## 9. REFERENCES

- Dahrouge, J.R. (2003) 2003 Exploration and Fieldwork within the Nordegg Metallic and Industrial Minerals Permit, West Central Alberta; ass. rept. for MAIM Permit 9396010038, Graymont Western Canada Inc., Dahrouge Geological Consulting Ltd., 12 p., 3 app., 4 fig., 3 tables.
- Dahrouge, J. and Tanton, J. (2006) 2005 Exploration and Fieldwork within the Nordegg Metallic and Industrial Minerals Permit, North Brazeau; ass. rept. for MAIM Permit 9396010038, Graymont Western Canada Inc., Dahrouge Geological Consulting Ltd., 13 p., 3 app., 4 fig., 3 tables.
- \_\_\_\_\_ (2006) 2006 Exploration and Fieldwork within the Brazeau Range Metallic and Industrial Minerals Permit, West-Central Alberta; ass. rept. for MAIM Permit 9302090596, Graymont Western Canada Inc., Dahrouge Geological Consulting Ltd., 9 p., 2 app., 3 fig., 1 table.
- Douglas, R.J.W. (1956) Nordegg, Alberta; Geol. Surv. Can. Paper 55-34.
- \_\_\_\_\_ (1958) Chungo Creek map-area, Alberta; Geol. Surv. Can. Paper 58-3.
- Erdman, O.A. (1950). Alexo and Saunders map-areas, Alberta; Geol. Surv. Can. Mem. 254.
- Halbertsma, H.L. (1994). Devonian Wabamun Group of the Western Canada Sedimentary Basin, in Geological Atlas of the Western Canada Sedimentary Basin. Mossop, G.D. and Shetsen, I. (compilers); Can. Soc. Petr. Geol. and Alberta Res. Coun., p. 221-250.
- Holter, M.E. (1976) Limestone resources of Alberta; Alta. Res. Coun. Econ. Geol. Rept. 4.
- Holter, M.E. (1994). A Review of Alberta Limestone Production, Marketing, Distribution and Future Development Possibilities. Alta. Geol. Surv., EUB, Open File Rept. 1994-15., 95 p., 57 figs.
- MacKenzie, W.S. (1966) Upper Devonian Stratigraphy in the Vicinity of Mountain Park, Alberta, in Eighth Ann. Field Trip Guidebook, Edm. Geol. Soc., p.19-29.
- Mackenzie, W.S.(1969). Stratigraphy of the Devonian Southesk Cairn carbonate complex and associated strata, eastern Jasper National Park, Alberta. Geol. Surv. Bull. 184.
- MacQueen, R.W., and Bamber, E.W. (1968) Stratigraphy and facies relationships of the Upper Mississippian Mount Head Formation, Rocky Mountains and Foothills, south western Alberta; Bull. Can. Petr. Geol., v. 16, p. 225-287.
- Matthews, J.G. (1960) Preliminary report on the Nordegg limestone deposit; Alta. Geol. Surv., Alta. Res. Coun. Internal Rept. (not available for consultation).
- Mountjoy, E.W., Price, R.A. and Lebel, D. (1992). Geology and structure cross-section, Mountain Park, Alberta. Geol. Surv. Can., Map 1830A, scale 1:50000.

- Mossop, G.D. and Shetsen, I. (1994) Geological Atlas of the Western Canada Sedimentary Basin, G.D. Mossop and I. Shetsen (comps.); Can. Soc. Petr. Geol. and Alberta Res. Coun.
- Pana, D. and Dahrouge, J. (1998) 1994, 1995 and 1997 Exploration of the Northern Part of Brazeau Range; ass. rept. for MAIM Permit 9396010038, Continental Lime Ltd., Dahrouge Geological Consulting Ltd., 20 p., 23 app., 9 fig., 4 tables.
- Richards, B.C., Barclay, J.E., Bryan, D., Hartling, A., Henderson, C.M. and Hinds, R.C. (1994). Carboniferous strata of the Western Canada Sedimentary Basin *in* Geological Atlas of the Western Canada Sedimentary Basin. G.D. Mossop and I. Shetsen (compilers), Can. Soc. Petr. Geol. And Alberta Res. Coun., p. 221-250.
- Switzer, S.B., Holland, W.G., Christie, S.D., Graf, G.C., Hedinger, A.S., McAuley, R.J., Wierezbicki, R.A and Packard, J.J. (1994). Devonian Woodbend-Winterburn Strata of the Western Canadian Sedimentary Basin *in* Geological Atlas of the Western Canada Sedimentary Basin. G.D. Mossop and I. Shetsen (compilers), Can. Soc. Petr. Geol. And Alberta Res. Coun., p. 165-202.
- Stott, D.F. and Aitken, J.D. (1993) Sedimentary Cover of the Craton in Canada, D.F. Stott and J.D. Aitken (ed.); Geol. Surv. Can. Geology of Canada, no. 5., pp. 202 - 271.

**10. STATEMENT OF QUALIFICATIONS**

I, Jocelyn Tanton, residing at 130 Rue Marquet, Beaumont, Alberta, do hereby certify that:

- I am a geologist of Dahrouge Geological Consulting Ltd., Suite 18, 10509 - 81 Ave., Edmonton, Alberta, T6E 1X7.
- I am a 2003 graduate of the University of Alberta, Edmonton, Alberta with a B.Sc. in Geology.
- I have practiced my profession as a geologist continuously since 2003.
- I am a registered professional geologist with the Association of Professional Engineers, Geologists and Geophysicists of Alberta, member M67719.
- I hereby consent to the copying or reproduction of this Technical Report following the one-year confidentiality period.
- I am the author of the report entitled "2007 Exploration and Fieldwork within the Brazeau Range Metallic and Industrial Mineral Permits, West-Central Alberta" and accept responsibility for the veracity of technical data and results.

Dated this 14<sup>th</sup> day of March, 2008.

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Jocelyn Tanton, B.Sc., P.Geol.  
APEGGA M67719

## APPENDIX 1: ITEMIZED COST STATEMENT FOR THE 2007 EXPLORATION

a) <u>Personnel</u>	\$ 23,223.01
b) <u>Food and Accommodation</u>	\$ 1,600.39
c) <u>Transportation</u>	\$ 5,732.03
d) <u>Instrument Rental</u>	\$ 8,482.65
e) <u>Drilling</u>	\$ 76,773.51
f) <u>Analyses</u>	\$ 3,953.00
g) <u>Report</u>	\$ 93.50
h) <u>Other</u>	\$ 2,486.66
<u>Total</u>	<u>\$ 122,344.75</u>
<u>Administration (10%)</u>	\$ 12,234.48
<u>Total + Administration</u>	\$ 134,579.23

C

# DIAMOND DRILL LOG

C1

Company: **GRAYMONT WESTERN CANADA INC.**

Project: **Nordegg Drilling 2007**

Hole No: **N07-01**

Core Size: **BTW**

**Dip Tests**

Depth    Angle

Permit: **9396010038**    Co-ordinates (UTM, NAD 83)

Date Started: **Oct. 28/07**

Casing: **6.10 m**

Bearing: **015°**

Easting: **560350**

Date Finished: **Oct. 30/07**

Total Depth: **78.33 m**

Inclination: **-65°**

Northing: **5818158**

Date Logged: **Nov. 19-23/07**

Province: **AB**

Elevation: **1466 m**

Logged By: **P. Kluczny**

From (m)	To (m)	Tkns (m)	Description	Sample #	From (m)	To (m)	Length (m)	CaCO <sub>3</sub> (%)	MgCO <sub>3</sub> (%)	SiO <sub>2</sub> (%)	Fe <sub>2</sub> O <sub>3</sub> (%)	Al <sub>2</sub> O <sub>3</sub> (%)	Na <sub>2</sub> O (ppm)	K <sub>2</sub> O (ppm)	MnO (ppm)
0.00	6.10	6.10	CASING: Overburden. 0.50=ground												
6.10	16.94	10.84	BRECCIATED DOLOMITIC LIMESTONE AND SILTSTONE (SHUNDA FM.) light-brown to medium-brown-grey (brown-grey etched), vfg to mg, difficult to ID bioclasts due to brecciation; overall calcite: 15%, locally up to 70%, present as fine veinlets and larger veins; weakly stylolitic (highly random stylolites); dolomite is present as finely disseminated, overall dolomite: 30%, locally up to 70%, secondary mottling?; moderately to highly fractured throughout (to rubbly) with weak surficial weathering 8.90-9.55: highly fractured with sandy material in fractures 14.66-16.94: weakly brecciated, finely bedded (<1 cm) dolomitic siltstone unit is moderately siliceous (weak reaction during etching)  base marked at sharp stylolitic contact with dolomitic pkst to grst, ~50° to CA	41376	6.10	8.83	2.73	74.09	15.69	8.18	0.11	0.16	138	563	62
				41377	8.83	10.63	1.80	89.23	6.80	2.01	0.18	0.40	168	1279	37
				41378	10.63	14.61	3.98	91.87	1.21	4.85	0.09	0.06	163	184	85
				41379	14.61	17.00	2.39	83.92	4.39	9.86	0.07	0.06	150	146	52
16.94	39.29	22.35	INTERBEDDED DOLOMITIC SILTSTONE AND DOLOMITIC LIME PACKSTONE TO GRAINSTONE (PEKISKO FM.?) Siltstone: light- to medium-brown-grey, rare fragmented bioclast (difficult to ID); moderately sorted (fg to mg); dolomite might be secondary (pieces of dark limestone are evident in brown dolomite matrix), overall dolomite 50-60%, locally up to 90%, dolomite is silty; Pkst to grst: medium- to dark-grey, poorly sorted: fg to cg; bioclast-rich: crinoid ossicles, shell fragments, rare large gastropod and pelecypod shell (up to 2 cm); overall dolomite ~5%, finely disseminated, secondary?; weakly to moderately fractured throughout with weak surficial weathering, weakly brecciated by dolomite throughout?; overall calcite <5%, present as fine veinlets 26.52-29.00: dominantly dolo lime pkst to grst  base marked at noticeable decrease in dolomite and increase in medium-brown-grey grst, somewhat ambiguous and gradational	41380	17.00	20.75	3.75	75.60	23.30	0.65	0.07	0.11	200	442	31
				41381	20.75	23.13	2.38	71.47	26.84	0.95	0.09	0.15	177	695	36
				41382	23.13	24.68	1.55	75.32	23.51	0.70	0.09	0.07	175	267	37
				41383	24.68	26.52	1.84	82.15	16.74	0.63	0.08	0.08	193	321	29
				41384	26.52	30.03	3.51	70.59	28.01	0.90	0.08	0.11	220	454	35
				41385	30.03	33.22	3.19	65.53	31.92	1.64	0.12	0.33	296	1505	39
				41386	33.22	34.77	1.55	79.18	19.48	0.77	0.10	0.14	206	573	39
				41387	34.77	35.66	0.89	93.88	4.80	0.78	0.08	0.06	199	222	30
				41388	35.66	37.36	1.70	80.11	18.60	0.65	0.08	0.08	227	329	42
				41389	37.36	39.29	1.93	79.23	17.56	1.09	0.13	0.22	237	670	50
39.29	54.90	15.61	LIME GRAINSTONE (similar to above but with lower dolomite content) (PEKISKO FM.) medium-grey (medium-brown-grey etched), poorly sorted (fg to cg); bioclast-rich: crinoid ossicles, shells and shell fragments up to 1 cm; overall calcite <5%, present as fine veinlets; minor dolomite mottling and spidery veinlets, <5% dolomite overall; moderately to strongly fractured with weak surficial weathering throughout; limy throughout (except for very minor secondary dolomite); quite homogeneous  base marked at sharp stylolitic contact with clay-altered dolomitic mdst, ~85° to the CA	41390	39.29	40.95	1.66	97.11	2.21	0.30	0.06	0.03	269	99	31
				41391	40.95	42.78	1.83	98.24	1.17	0.26	0.11	0.03	264	87	36
				41392	42.78	44.30	1.52	98.30	1.20	0.21	0.04	0.03	269	80	23
				41393	44.30	45.67	1.37	98.55	0.79	0.35	0.06	0.03	212	71	29
				41394	45.67	47.85	2.18	98.68	0.78	0.13	0.06	0.02	214	68	26
				41395	47.85	49.24	1.39	98.43	0.87	0.33	0.07	0.04	238	111	29
				41396	49.24	50.16	0.92	98.60	0.87	0.19	0.07	0.03	224	67	28
				41397	50.16	51.44	1.28	98.83	0.78	0.13	0.05	0.02	175	78	23
				41398	51.44	53.56	2.12	98.61	0.93	0.21	0.04	0.04	165	108	26
				41399	53.56	54.90	1.34	98.40	1.00	0.32	0.03	0.04	150	188	27



# DIAMOND DRILL LOG

Company: **GRAYMONT WESTERN CANADA INC.**

Project: **Nordegg Drilling 2007**

Hole No: **N07-02**

Core Size: **BTW**

Casing: **4.57 m**

Total Depth: **98.76 m**

**Dip Tests**

Depth    Angle

Permit: **9396010038**    Co-ordinates (UTM, NAD 83)

Date Started: **Oct. 24/07**

Date Finished: **Oct. 27/07**

Date Logged: **Nov. 19-23/07**

Logged By: **P. Kluczny**

Bearing: **N/A**    Easting: **560359**

Inclination: **-90°**    Northing: **5818793**

Province: **AB**    Elevation: **1477 m**

From (m)	To (m)	Tkns (m)	Description	Sample #	From (m)	To (m)	Length (m)	CaCO <sub>3</sub> (%)	MgCO <sub>3</sub> (%)	SiO <sub>2</sub> (%)	Fe <sub>2</sub> O <sub>3</sub> (%)	Al <sub>2</sub> O <sub>3</sub> (%)	Na <sub>2</sub> O (ppm)	K <sub>2</sub> O (ppm)	MnO (ppm)
0.00	4.57	4.57	CASING: Overburden. 0.50=ground												
4.57	15.79	11.22	SHALE (EXSHAW FM.) dark-brown-grey to black, very well sorted (fg), no visible bioclasts; minor amount of dolomite in beds, 5-10% dolomite overall; strong shaley partings throughout, very minor disseminated pyrite (<1 mm); very weakly fractured (not including shale partings); bedding is very consistent throughout at 65-70° to CA; siliceous throughout (<10% carbonates)  base marked at sharp fractured contact with dolomite-mottled lmst. ~75° to CA	41466	4.57	13.45	8.88	52.79	5.46	22.83	1.69	2.88	784	19062	350
				41467	13.45	15.80	2.35	47.46	6.14	21.37	1.73	2.70	723	20665	418
15.79	42.53	26.74	DOLOMITE-MOTTLED LIME MUDSTONE TO WACKESTONE (PALLISER FM.) medium- to dark-grey (dark-grey and brown-grey (dolomite) etched), moderately sorted; cryptocrystalline to fg; mud-rich: fg crinoid ossicles and shell fragments (all <2 cm); overall calcite <5%, present as fine veinlets; overall weakly fractured, moderately fractured with strong surficial weathering from 20.58-22.38; relatively massive and homogeneous; other than mottling the unit is limey throughout; weakly stylolitic  base marked at gradational contact into well-bedded dolo mdst	41468	15.80	17.58	1.78	83.17	1.80	10.60	0.76	1.65	392	8600	737
				41469	17.58	19.14	1.56	75.61	8.79	8.51	0.88	1.96	533	9932	594
				41470	19.14	20.58	1.44	73.74	9.60	9.39	0.85	2.10	418	11693	476
				41471	20.58	22.14	1.56	91.35	2.89	3.45	0.55	0.75	359	3687	254
				41472	22.14	23.76	1.62	92.42	2.42	3.48	0.36	0.58	251	2854	203
				41473	23.76	25.65	1.89	94.15	1.84	2.52	0.25	0.48	182	2491	148
				41474	25.65	27.38	1.73	94.04	1.80	2.46	0.26	0.51	172	2484	156
				41475	27.38	29.26	1.88	93.49	2.59	2.33	0.29	0.52	172	2625	142
				41476	29.26	31.24	1.98	94.81	2.16	1.97	0.24	0.37	154	1913	119
				41477	31.24	33.02	1.78	94.96	1.96	2.08	0.22	0.34	161	1676	98
				41478	33.02	34.98	1.96	95.82	1.32	1.82	0.19	0.31	168	1595	87
				41479	34.98	36.89	1.91	95.37	1.51	1.96	0.19	0.37	217	1935	85
				41480	36.89	38.40	1.51	88.57	5.86	3.25	0.41	0.70	212	3463	152
				41481	38.40	40.22	1.82	90.64	4.83	2.81	0.36	0.54	197	2581	141
				41482	40.22	41.97	1.75	93.35	3.31	2.27	0.22	0.40	171	1992	78
				41483	41.97	42.53	0.56	92.27	3.38	2.17	0.19	0.32	147	1639	74
42.53	52.40	9.87	CALCAREOUS DOLOMITIC MUDSTONE (PALLISER FM.) medium- to dark-grey in first 2.5 m, becomes significantly lighter due to increased dolomite content; well sorted (vfg), no visible bioclasts, ~50% dolomite and 50% lmst in first 2.3 m of interval, afterwards almost completely dolomite (5-10% lmst); overall calcite 5-10%, present as fine veinlets (healed fractures); moderately fractured overall; well-bedded throughout, consistently ~65° to CA; weakly stylolitic 50.30-50.60: rubbly with strong surficial weathering  base marked at beginning of soft, poorly consolidated dolo mdst, somewhat gradational and/or arbitrary contact	41484	42.53	44.50	1.97	93.40	3.67	1.78	0.23	0.37	176	1749	80
				41485	44.50	46.15	1.65	78.04	18.67	1.92	0.37	0.35	238	1583	161
				41486	46.15	47.65	1.50	75.24	22.59	1.29	0.24	0.17	268	775	162
				41487	47.65	49.58	1.93	61.62	34.75	1.91	0.29	0.38	221	1517	162
				41488	49.58	51.14	1.56	56.14	40.12	2.17	0.33	0.33	234	1289	176
				41489	51.14	52.79	1.65	58.36	37.14	2.55	0.22	0.34	243	1552	107

# DIAMOND DRILL LOG

C4

**Company:** GRAYMONT WESTERN CANADA INC.  
**Project:** Nordegg Drilling 2007

**HOLE No. N07-02**

From (m)	To (m)	Tkns (m)	Description	Sample #	From (m)	To (m)	Length (m)	CaCO <sub>3</sub> (%)	MgCO <sub>3</sub> (%)	SiO <sub>2</sub> (%)	Fe <sub>2</sub> O <sub>3</sub> (%)	Al <sub>2</sub> O <sub>3</sub> (%)	Na <sub>2</sub> O (ppm)	K <sub>2</sub> O (ppm)	MnO (ppm)
52.40	80.93	28.53	POORLY CONSOLIDATED CALCAREOUS DOLOMITIC MUDSTONE (PALLISER FM.?) continuation of above but poorly consolidated, light-brown-grey; well sorted (vfg to fg); rubbly to powdery; overall calcite 5-10%, present as fine veinlets; probably >75% dolomite and <25% lmst; patches of weak surficial weathering throughout, poor recoveries throughout; 55.00: bedding is 75° to CA.  base marked at beginning of vuggy dolo mdst, sharp but rubbly, very irregular	41490	52.79	54.35	1.56	68.47	24.06	4.26	0.26	0.98	292	3754	104
				41491	54.35	56.21	1.86	55.63	40.98	2.29	0.16	0.38	380	1286	152
				41492	56.21	57.65	1.44	54.95	43.08	1.19	0.13	0.19	257	727	176
				41493	57.65	60.22	2.57	79.11	15.88	3.38	0.14	0.42	285	1958	72
				41494	60.22	63.09	2.87	54.83	43.33	1.32	0.09	0.14	253	602	67
				41495	63.09	66.14	3.05	52.87	41.85	3.55	0.23	0.55	343	2403	69
				41496	66.14	72.24	6.10	52.53	42.50	3.03	0.14	0.36	265	1576	63
				41497	72.24	75.29	3.05	52.68	41.58	3.62	0.11	0.36	337	1496	66
				41498	75.29	80.92	5.63	51.82	40.51	4.78	0.20	0.61	516	2252	76
				80.93	98.67	17.74	VUGGY CALCAREOUS DOLOMITIC MUDSTONE (PALLISER FM.?) light- to medium-brown-grey, well sorted (fg); moderately vuggy throughout; overall calcite 10-15%, present as fine veinlets and crystalline porosity fill; weakly to moderately fractured throughout with weak surficial weathering; weakly stylolitic; probably >75% dolomite and <25% lmst; much more competent than above unit; moderately bedded, wavy and irregular beds at ~60-80° to CA, sometimes stylolitic very large (cm-scale) vugs: 84.08-84.43, 93.45-99.67  EOH = 99.67 m	41499	80.92	81.53	0.61	57.00	36.49	3.84	0.27
41500	81.53	83.19	1.66					55.40	40.85	2.33	0.15	0.32	352	1395	67
41501	83.19	85.02	1.83					59.69	38.40	1.34	0.13	0.15	276	671	64
41502	85.02	86.91	1.89					54.40	42.51	1.54	0.11	0.23	369	1041	58
41503	86.91	88.57	1.66					55.13	42.24	1.59	0.12	0.29	323	1218	66
41504	88.57	90.36	1.79					54.19	40.87	3.11	0.23	0.61	360	2693	65
41505	90.36	92.03	1.67					54.20	42.22	2.10	0.16	0.38	396	1646	68
41506	92.23	93.44	1.21					54.80	42.32	1.94	0.16	0.32	392	1428	72
41507	93.44	94.85	1.41					57.06	38.84	2.16	0.18	0.38	281	1603	117
41508	94.85	96.62	1.77					56.88	40.65	1.22	0.15	0.26	285	1112	176
				41509	96.62	99.67	3.05	50.10	37.43	8.46	0.15	0.18	277	763	183

# DIAMOND DRILL LOG

C5

**Company:** GRAYMONT WESTERN CANADA INC.

**Project:** Nordegg Drilling 2007

**Hole No:** N07-03

**Dip Tests**

**Permit:** 9396010038

**Co-ordinates (UTM, NAD 83)**

**Date Started:** Oct. 31/07

**Core Size:** BTW

Depth Angle

**Bearing:** 005°

**Easting:** 560431

**Date Finished:** Nov. 05/07

**Casing:** 6.10 m

**Inclination:** -65°

**Northing:** 5817783

**Date Logged:** Nov. 19-23/07

**Total Depth:** 93.57 m

**Province:** AB

**Elevation:** 1430 m

**Logged By:** P. Kluczny

From (m)	To (m)	Tkns (m)	Description	Sample #	From (m)	To (m)	Length (m)	CaCO <sub>3</sub> (%)	MgCO <sub>3</sub> (%)	SiO <sub>2</sub> (%)	Fe <sub>2</sub> O <sub>3</sub> (%)	Al <sub>2</sub> O <sub>3</sub> (%)	Na <sub>2</sub> O (ppm)	K <sub>2</sub> O (ppm)	MnO (ppm)
0.00	6.10	6.10	CASING: Overburden, 0.50=ground												
6.10	25.51	19.41	DOLOMITIC MUDSTONE (TURNER VALLEY FM.) white to light-grey (light-brown-grey etched), well sorted (vfg to fg), no visible bioclasts; strongly vuggy, vugs up to 2 cm in size, present as open space; overall calcite <5%, present as fine veinlets; some veining and banding with hard (>steel) white chalky mineral (chert?), 5-10% overall, definitely secondary; weakly to moderately brecciated throughout by veining, moderately to strongly fractured throughout; very minor bands/beds(?) of black carbonaceous material scattered throughout; massive (no visible bedding); dolomitic throughout (very minor lmst); some dolomite might be secondary (lighter color)  base marked at sharp increase in white chert(?), appearance of vfg to fg sandstone, less vugs, ambiguous due to fracturing and bleaching	41415	6.10	10.32	4.22	53.40	44.18	1.32	0.27	0.20	475	1055	305
				41416	10.32	11.88	1.56	49.16	38.52	9.17	0.23	0.11	422	533	256
				41417	11.88	13.56	1.68	54.14	44.82	0.57	0.11	0.09	630	384	240
				41418	13.56	14.33	0.77	54.14	44.95	0.31	0.12	0.22	610	259	247
				41419	14.33	16.12	1.79	54.27	44.86	0.35	0.10	0.04	595	165	230
				41420	16.12	18.00	1.88	54.44	44.69	0.40	0.09	0.05	626	237	200
				41421	18.00	19.89	1.89	54.15	44.18	0.80	0.09	0.13	457	620	164
				41422	19.89	21.52	1.63	54.53	44.66	0.42	0.09	0.06	509	291	171
				41423	21.52	22.93	1.41	54.47	44.69	0.40	0.12	0.05	500	226	131
				41424	22.93	24.55	1.62	54.44	44.77	0.44	0.08	0.05	468	209	107
				41425	24.55	25.52	0.97	54.27	44.62	0.75	0.10	0.07	518	258	100
25.51	41.39	15.88	INTERBEDDED(?) DOLOMITIC MUDSTONE AND VFG TO MG DOLOMITIC SANDSTONE (TURNER VALLEY FM.) unit has bleached (chalky white) appearance probably due to secondary chert(?) in highly irregular mottles and veins, ~15-20% overall Dolomdnt (~60%): light-grey, homogeneous and massive; well sorted (vfg); weakly vuggy; some secondary dolomite (white-grey color) Sandstone (~40%): medium- to dark-grey (difficult to identify because of bleaching), hardness is ≥steel; moderately sorted (fg to mg); no vugs; secondary(?) dolo 5-10% overall c.u.c.: 28.20-28.24 difficult to distinguish lithologies due to bleaching; weakly to moderately fractured throughout and weakly brecciated throughout by veining; overall calcite <5%, present as fine veinlets; bedding in siliceous unit is wavy and/or irregular, 75-85° to CA sandy yellow clay alteration (pervasive): 39.00-39.10, 39.29-39.35, 41.14-41.16  base marked at sharp fractured contact with vuggy carb-rich dolomitic mdst to siltstone, ~75° to CA	41426	25.52	27.25	1.73	50.89	40.70	5.58	0.14	0.22	254	944	174
				41427	27.25	29.05	1.80	51.21	40.98	4.17	0.12	0.16	387	610	138
				41428	29.05	30.79	1.74	50.14	41.35	6.38	0.06	0.04	440	138	77
				41429	30.79	32.61	1.82	52.38	43.18	3.58	0.09	0.04	399	132	83
				41430	32.61	34.40	1.79	48.65	39.80	8.97	0.09	0.05	346	171	75
				41431	34.40	36.03	1.63	52.46	43.28	3.01	0.13	0.08	324	333	103
				41432	36.03	37.44	1.41	50.95	42.31	5.24	0.14	0.12	296	483	127
				41433	37.44	38.88	1.44	51.87	41.81	4.83	0.18	0.66	321	3545	87
				41434	38.88	40.24	1.36	49.49	39.24	6.25	0.44	1.31	322	6360	91
				41435	40.24	41.39	1.15	52.43	41.53	3.83	0.31	0.75	347	3528	95
41.39	52.64	11.25	CARBONACEOUS DOLOMITIC MUDSTONE (TURNER VALLEY FM.) light- to medium-brown-grey with black carbonaceous material, well sorted (vfg to fg); vuggy, vugs are filled with carbonaceous material or just open space; overall calcite <1%, present as fine veinlets; highly fractured to completely rubble; carbonaceous material in fractures and vugs ~5% overall; weakly to moderately brecciated throughout with a dolomite matrix; probably ~60-70% dolomite, ~20% siliceous, very minor lmst 47.75-48.85: silty rubble (primary?) 50.50-51.45: fg sandy rubble (primary?)  base marked at sharp wavy contact with competent dolo mdst, structural?, ~50° to CA	41436	41.39	43.42	2.03	53.50	43.26	1.11	0.10	0.06	371	225	140
				41437	43.42	44.81	1.39	54.00	44.74	0.80	0.10	0.07	450	298	153
				41438	44.81	46.50	1.69	54.10	43.76	0.90	0.11	0.06	334	225	153
				41439	46.50	47.67	1.17	53.76	44.24	1.13	0.12	0.14	430	616	125
				41440	47.67	49.00	1.33	53.50	42.36	2.14	0.16	0.42	415	1441	118
				41441	49.00	50.90	1.90	55.11	41.98	1.09	0.10	0.06	289	191	119
				41442	50.90	52.65	1.75	52.59	41.17	3.10	0.37	0.58	367	2060	152

# D DRILL LOG

Company: **GRAYMONT WESTERN CANADA INC.**  
 Project: **Nordegg Drilling 2007**

HOLE No. **N07-03**

From (m)	To (m)	Tkns (m)	Description	Sample #	From (m)	To (m)	Length (m)	CaCO <sub>3</sub> (%)	MgCO <sub>3</sub> (%)	SiO <sub>2</sub> (%)	Fe <sub>2</sub> O <sub>3</sub> (%)	Al <sub>2</sub> O <sub>3</sub> (%)	Na <sub>2</sub> O (ppm)	K <sub>2</sub> O (ppm)	MnO (ppm)
52.64	56.88	4.24	DOLOMITIC MUDSTONE (TURNER VALLEY FM.) light-grey (light-brown-grey etched), relatively homogeneous and massive (no indication of bedding); well sorted (vg to fg); overall calcite <5%, present as fine veinlets; weakly vuggy in last 0.5 metres of interval; overall weakly fractured; dolomitic throughout 54.76-56.50: rubbly silty interval, obvious core loss  base marked at sharp, rubbly contact with dark-grey lime mdst	41443 41444	52.65 54.49	54.49 56.87	1.84 2.38	48.07 54.37	37.76 36.73	7.11 5.37	0.45 0.33	1.50 0.69	458 363	8267 3674	138 158
56.88	93.57	36.69	BRECCIATED AND ALTERED: LIME MUDSTONE (?) WITH SILICEOUS AND DOLOMITIC MUDSTONE TO SILTSTONE INTERBEDS (SHUNDA FM.) Mdst: medium- to dark-grey, difficult to ID grains due to brecciation and alteration; well sorted (fg); dolomite mottling, overall dolomite 5-10%, mostly secondary(?) Interbeds: light- to medium-brown-grey, heavy surficial weathering and pale orange clay alteration; difficult to determine relationship with mdst, bedding?; moderately sorted (fg to mg); overall dolomite 10-15%, primary and secondary?; moderately siliceous moderately to strongly brecciated with calcite and/or clay to sand matrix; overall calcite 5-10%, locally up to 50%, present as veins, veinlets and breccia matrix; slightly vuggy with open space; moderately to highly fractured throughout with moderate to strong surficial weathering (even approaching pervasive alteration); very little pristine host rock remains silty to sandy rubble (secondary?); 68.05-68.39, 69.38-69.84, 70.10-71.78, 71.95-75.29, 81.10-81.62, 83.90-88.90, 91.60-92.65  EOH = 93.57 m	41445 41446 41447 41448 41449 41450 41451 41452 41453 41454 41455 41456 41457 41458 41459 41460 41461 41462 41463 41464 41465	56.87 58.42 60.26 61.80 63.39 65.31 66.94 68.58 69.35 71.75 73.88 75.29 76.75 77.04 78.88 80.57 83.90 87.48 89.12 90.77 91.90 91.90	58.42 60.26 61.80 63.39 65.31 66.94 68.58 69.35 71.75 73.88 75.29 76.75 77.04 78.88 80.57 83.90 87.48 89.12 90.77 91.90 93.57	1.55 1.84 1.54 1.59 1.92 1.63 1.64 0.77 2.40 2.13 1.41 1.46 0.29 1.84 1.69 3.33 3.58 1.64 1.65 1.13 1.67	94.29 96.12 92.63 90.37 64.07 87.08 63.48 81.83 68.99 77.12 54.48 51.29 35.89 57.52 53.75 58.29 74.82 77.64 68.16 48.32 60.48	1.36 1.31 4.23 6.05 17.37 7.78 19.64 10.06 3.94 1.37 2.83 18.61 17.30 19.55 7.99 5.19 2.34 4.60 22.97 29.64 15.40	2.85 1.44 2.25 2.40 10.16 3.12 8.40 5.57 13.49 14.23 23.45 13.60 17.87 12.10 21.00 20.20 13.10 8.30 5.05 10.65 12.92	0.16 0.21 0.18 0.24 0.81 0.38 0.74 0.31 1.76 0.91 1.84 2.91 3.92 1.35 2.20 1.54 3.03 1.08 0.62 0.94 1.04	0.52 0.29 0.22 0.39 1.66 0.66 1.49 0.74 3.40 1.82 2.67 573 1592 2.85 4.44 3.21 3.77 2.48 1.53 2.31 2.48	240 151 123 142 325 126 272 154 352 290 1227 573 1592 506 636 698 377 597 306 334 396	2868 1535 823 2202 7938 3140 8044 3919 20320 11916 19415 15651 23110 14740 22018 19163 14591 13751 7906 12522 14415	83 71 79 92 194 144 190 185 270 239 255 316 389 354 341 295 238 222 174 213 235

10/Can Geo/Stone  
Sample

		%	%	%	%	%	%	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	%	%	%
		CaCO3	CaO	MgCO3	MgO	Fe2O3	Al2O3	SrCO3	MnO	SiO2	BaO	K2O	Na2O	P2O5	TiO2	S	LOI	Total
Nordeg MAM Permit 2007	41376	74.09	41.51	15.69	7.50	0.106	0.155	606	62	6.18	11	563	138	111	85	0.044	41.31	98.97
Nordeg MAM Permit 2007	41377	89.23	49.99	6.60	3.25	0.183	0.397	616	37	2.01	23	1279	168	101	174	0.032	43.55	99.65
Nordeg MAM Permit 2007	41378	91.87	51.47	1.21	0.58	0.088	0.059	560	85	4.85	6	184	163	<100	32	0.027	41.57	98.75
Nordeg MAM Permit 2007	41379	83.92	47.02	4.39	2.10	0.070	0.057	413	52	9.86	6	146	150	<100	46	0.030	39.77	98.99
Nordeg MAM Permit 2007	41380	75.60	42.36	23.30	11.14	0.074	0.108	328	31	0.65	6	442	200	<100	57	0.016	45.41	99.87
Nordeg MAM Permit 2007	41381	71.47	40.04	26.84	12.83	0.093	0.152	334	36	0.95	9	695	177	222	95	0.017	45.45	99.69
Nordeg MAM Permit 2007	41382	75.32	42.20	23.51	11.24	0.095	0.073	311	37	0.70	5	267	175	<100	39	0.010	45.29	99.69
Nordeg MAM Permit 2007	41383	82.15	46.03	16.74	8.00	0.078	0.080	356	29	0.63	5	321	193	211	40	0.010	45.01	99.96
Nordeg MAM Permit 2007	41384	70.59	39.55	28.01	13.39	0.081	0.110	265	35	0.90	7	454	220	<100	61	0.003	45.51	99.64
Nordeg MAM Permit 2007	41385	65.53	36.72	31.92	15.26	0.124	0.334	360	39	1.64	10	1505	296	<100	183	0.016	45.10	99.43
Nordeg MAM Permit 2007	41386	79.18	44.36	19.48	9.31	0.105	0.137	293	39	0.77	5	573	206	<100	75	0.018	45.42	100.24
Nordeg MAM Permit 2007	41387	93.88	52.60	4.80	2.29	0.080	0.063	435	30	0.78	5	222	199	154	46	0.017	44.07	100.01
Nordeg MAM Permit 2007	41388	80.11	44.89	18.60	8.89	0.085	0.084	286	42	0.65	4	329	227	120	52	0.008	45.05	99.76
Nordeg MAM Permit 2007	41389	79.23	44.39	17.56	8.39	0.130	0.221	294	50	1.09	11	670	237	121	112	0.009	44.82	99.21
Nordeg MAM Permit 2007	41390	97.11	54.41	2.21	1.06	0.061	0.031	412	31	0.30	2	99	269	<100	10	0.015	44.25	100.20
Nordeg MAM Permit 2007	41391	98.24	55.04	1.17	0.56	0.112	0.028	439	36	0.26	2	87	264	<100	12	0.013	44.21	100.30
Nordeg MAM Permit 2007	41392	98.30	55.08	1.20	0.57	0.042	0.026	463	23	0.21	2	80	269	200	11	0.018	44.48	100.53
Nordeg MAM Permit 2007	41393	98.55	55.22	0.79	0.38	0.061	0.027	446	29	0.35	2	71	212	<100	8	0.008	44.18	100.30
Nordeg MAM Permit 2007	41394	98.68	55.29	0.78	0.37	0.059	0.024	441	26	0.13	3	68	214	239	15	0.008	44.26	100.25
Nordeg MAM Permit 2007	41395	98.43	55.15	0.87	0.42	0.067	0.044	436	29	0.33	3	111	238	<100	24	0.012	44.65	100.75
Nordeg MAM Permit 2007	41396	98.60	55.25	0.87	0.41	0.072	0.029	452	28	0.19	3	67	224	115	20	0.013	44.21	100.26
Nordeg MAM Permit 2007	41397	98.83	55.37	0.78	0.37	0.046	0.023	449	23	0.13	2	78	175	<100	8	0.010	43.79	99.82
Nordeg MAM Permit 2007	41398	98.61	55.25	0.93	0.44	0.040	0.035	475	26	0.21	3	108	165	<100	14	0.014	43.78	99.85
Nordeg MAM Permit 2007	41399	98.40	55.13	1.00	0.48	0.030	0.042	551	27	0.32	4	188	150	<100	26	0.020	43.77	99.89
Nordeg MAM Permit 2007	41400	51.21	28.69	28.10	13.43	1.301	2.779	301	122	10.72	162	16183	488	272	1483	0.194	37.56	96.58
Nordeg MAM Permit 2007	41401	77.96	43.68	8.88	4.24	0.937	1.637	551	139	6.94	70	8980	392	140	890	0.251	38.99	97.79
Nordeg MAM Permit 2007	41402	36.08	20.22	22.14	10.58	1.907	3.749	194	228	20.99	113	27442	627	890	2495	1.560	27.97	90.18
Nordeg MAM Permit 2007	41403	43.36	24.29	28.28	13.52	0.825	2.017	232	355	18.29	59	12016	463	726	1564	0.545	34.04	95.07
Nordeg MAM Permit 2007	41404	51.97	29.12	26.01	12.43	1.020	2.161	311	222	10.73	78	13566	438	289	1259	0.837	37.11	95.02
Nordeg MAM Permit 2007	41405	71.89	40.28	14.78	7.07	0.611	1.366	483	170	7.06	158	8451	378	297	758	0.179	40.06	97.70
Nordeg MAM Permit 2007	41406	40.84	22.88	26.06	12.46	0.876	2.068	222	384	22.68	184	12174	810	534	1540	0.250	31.50	94.30
Nordeg MAM Permit 2007	41407	36.03	20.19	24.58	11.75	1.054	2.304	186	603	23.91	106	16182	664	1015	1893	0.571	28.66	90.51
Nordeg MAM Permit 2007	41408	36.30	20.34	24.26	11.60	1.366	3.038	223	432	20.29	599	20047	651	815	2589	1.040	28.95	89.16
Nordeg MAM Permit 2007	41409	37.62	21.08	25.74	12.30	1.172	3.063	187	483	19.94	88	18811	617	554	1866	0.364	30.33	90.51
Nordeg MAM Permit 2007	41410	40.90	22.92	23.17	11.08	1.329	2.671	207	496	20.04	83	18107	515	469	2034	0.781	30.63	91.63
Nordeg MAM Permit 2007	41411	40.89	22.91	26.76	12.79	0.993	2.010	213	506	21.55	413	12553	744	197	1396	0.281	31.81	93.94
Nordeg MAM Permit 2007	41412	39.65	22.21	26.54	12.69	1.105	2.393	209	443	20.51	211	14799	544	424	1950	0.604	31.33	92.70
Nordeg MAM Permit 2007	41413	36.94	20.70	25.28	12.09	1.414	2.569	181	606	20.04	99	16769	617	1076	1904	0.772	29.92	89.63
Nordeg MAM Permit 2007	41414	36.60	20.51	23.73	11.34	1.487	2.783	182	614	21.87	99	19228	734	1006	2047	0.823	28.24	89.45
Nordeg MAM Permit 2007	41415	53.40	29.92	44.18	21.12	0.267	0.205	139	305	1.32	11	1055	475	396	136	0.021	46.84	99.94
Nordeg MAM Permit 2007	41416	49.16	27.54	38.52	18.41	0.235	0.107	137	256	9.17	29	533	422	261	75	0.036	42.65	98.32
Nordeg MAM Permit 2007	41417	54.14	30.33	44.82	21.42	0.113	0.093	105	240	0.57	7	384	630	116	36	0.009	48.14	100.83
Nordeg MAM Permit 2007	41418	54.14	30.33	44.95	21.49	0.118	0.216	104	247	0.31	7	259	610	151	27	0.006	47.84	100.45
Nordeg MAM Permit 2007	41419	54.27	30.40	44.86	21.44	0.097	0.039	121	230	0.35	7	165	595	175	13	0.006	47.85	100.32
Nordeg MAM Permit 2007	41420	54.44	30.50	44.69	21.36	0.094	0.047	108	200	0.40	6	237	626	117	25	0.004	47.74	100.28
Nordeg MAM Permit 2007	41421	54.15	30.34	44.18	21.12	0.092	0.128	92	164	0.80	9	620	457	<100	83	0.001	46.99	99.61
Nordeg MAM Permit 2007	41422	54.53	30.55	44.66	21.35	0.090	0.062	99	171	0.42	6	291	509	<100	47	0.004	47.80	100.39
Nordeg MAM Permit 2007	41423	54.47	30.52	44.69	21.36	0.118	0.048	93	131	0.40	5	226	500	<100	21	0.003	47.48	100.03
Nordeg MAM Permit 2007	41424	54.44	30.50	44.77	21.40	0.083	0.051	101	107	0.44	7	209	468	<100	36	0.000	47.24	99.81
Nordeg MAM Permit 2007	41425	54.27	30.41	44.62	21.33	0.097	0.068	117	100	0.75	6	258	518	<100	43	0.002	47.11	99.87
Nordeg MAM Permit 2007	41426	50.89	28.51	40.70	19.45	0.137	0.220	96	174	5.58	16	944	254	<100	116	0.012	43.63	97.71
Nordeg MAM Permit 2007	41427	51.21	28.70	40.98	19.59	0.115	0.161	104	138	4.17	9	610	387	105	110	0.007	44.72	97.60
Nordeg MAM Permit 2007	41428	50.14	28.09	41.35	19.77	0.060	0.039	105	77	6.38	5	138	440	198	30	0.007	43.87	98.32
Nordeg MAM Permit 2007	41429	52.38	29.35	43.18	20.64	0.091	0.036	112	83	3.58	6	132	399	<100	27	0.003	45.48	99.25
Nordeg MAM Permit 2007	41430	48.65	27.26	39.80	19.03	0.087	0.054	99	75	8.97	7	171	346	<100	32	0.004	42.67	98.14
Nordeg MAM Permit 2007	41431	52.46	29.39	43.28	20.69	0.127	0.078	92	103	3.01	10	333	324	356	67	0.000	45.81	99.23
Nordeg MAM Permit 2007	41432	50.95	28.55	42.31	20.22	0.143	0.117	88	127	5.24	9	483	296	101	108	0.000	44.74	99.13
Nordeg MAM Permit 2007	41433	51.87	29.06	41.81	19.99	0.177	0.664	111	87	4.83	47	3545	321	172	416	0.005	44.37	99.57
Nordeg MAM Permit 2007	41434	49.49	27.73	39.24	18.76	0.435	1.313	206	91	6.25	3700	6360	322	356	625	0.110	42.57	98.33
Nordeg MAM Permit 2007	41435	52.43	29.38	41.53	19.85	0.314	0.754	125	95	3.83	110	3528	347	389	407	0.011	44.74	99.37
Nordeg MAM Permit 2007	41436	53.50	29.98	43.26	20.68	0.100	0.056	147	140	1.11	10	225	371	<100	37	0.147	48.04	100.20
Nordeg MAM Permit 2007	41437	54.00	30.25	44.74	21.38	0.104	0.070	132	153	0.80	12	298	450	202	51	0.058	47.58	100.38
Nordeg MAM Permit 2007	41438	54.10	30.31	43.76	20.92	0.112	0.060	144	153	0.90	24	225	334	<100	43	0.051	47.71	100.15
Nordeg MAM Permit 2007	41439	53.76	30.12	44.24	21.15	0.123	0.142	135	125	1.13	28	616	430	123	92	0.020	47.23	100.07

## 10/Can Geo/Stone

Sample	% CaCO3	% CaO	% MgCO3	% MgO	% Fe2O3	% Al2O3	ppm SrCO3	ppm MnO	% SiO2	ppm BaO	ppm K2O	ppm Na2O	ppm P2O5	ppm TiO2	% S	% LOI	% Total
Nordegg MAIM Permit 2007 41440	53.50	29.97	42.36	20.25	0.157	0.417	83	118	2.14	35	1441	415	238	160	0.019	46.88	100.09
Nordegg MAIM Permit 2007 41441	55.11	30.88	41.98	20.07	0.105	0.064	135	119	1.09	32	191	289	<100	34	0.021	47.32	99.63
Nordegg MAIM Permit 2007 41442	52.59	29.46	41.17	19.88	0.365	0.581	176	152	3.10	60	2060	367	222	276	0.058	46.28	99.86
Nordegg MAIM Permit 2007 41443	48.07	26.94	37.76	18.05	0.454	1.498	156	138	7.11	136	6267	458	<100	803	0.021	42.15	97.22
Nordegg MAIM Permit 2007 41444	54.37	30.46	36.73	17.56	0.325	0.686	478	158	5.37	564	3674	363	<100	350	0.027	43.86	98.85
Nordegg MAIM Permit 2007 41445	94.29	52.83	1.36	0.65	0.155	0.517	618	83	2.85	38	2868	240	<100	226	0.051	42.26	99.72
Nordegg MAIM Permit 2007 41446	96.12	53.85	1.31	0.63	0.212	0.290	529	71	1.44	17	1535	151	236	139	0.057	43.01	99.76
Nordegg MAIM Permit 2007 41447	92.63	51.90	4.23	2.02	0.184	0.217	353	79	2.25	28	823	123	<100	99	0.043	43.16	99.92
Nordegg MAIM Permit 2007 41448	90.37	50.63	6.05	2.89	0.243	0.388	320	92	2.40	39	2202	142	<100	185	0.080	43.02	99.95
Nordegg MAIM Permit 2007 41449	64.07	35.90	17.37	8.30	0.812	1.665	360	194	10.16	54	7938	325	218	1124	0.080	38.37	96.30
Nordegg MAIM Permit 2007 41450	87.08	48.79	7.78	3.72	0.380	0.662	469	144	3.12	82	3140	126	106	354	0.061	42.39	99.56
Nordegg MAIM Permit 2007 41451	63.48	35.57	19.64	9.39	0.740	1.486	349	190	8.40	68	8044	272	315	993	0.065	39.45	96.13
Nordegg MAIM Permit 2007 41452	81.83	45.85	10.06	4.81	0.305	0.742	397	185	5.57	30	3919	154	146	348	0.052	41.33	99.18
Nordegg MAIM Permit 2007 41453	68.99	38.65	3.94	1.88	1.762	3.395	339	270	13.49	510	20320	352	766	1955	0.076	32.85	94.56
Nordegg MAIM Permit 2007 41454	77.12	43.21	1.37	0.65	0.913	1.824	430	239	14.23	121	11916	290	186	1320	0.072	34.03	96.38
Nordegg MAIM Permit 2007 41455	54.48	30.52	2.83	1.35	1.839	2.668	377	255	23.45	188	19415	1227	894	2688	0.175	26.40	88.91
Nordegg MAIM Permit 2007 41456	51.29	28.74	18.61	8.90	1.411	2.907	352	316	13.60	857	15651	573	451	1760	0.085	33.94	91.57
Nordegg MAIM Permit 2007 41457	35.89	20.11	17.30	8.27	1.986	3.922	166	389	17.87	159	23110	1592	1198	3445	1.110	24.68	80.95
Nordegg MAIM Permit 2007 41458	57.52	32.23	19.55	9.35	1.351	2.845	269	354	12.10	214	14740	506	644	1726	0.074	35.76	95.55
Nordegg MAIM Permit 2007 41459	53.75	30.12	7.99	3.82	2.203	4.435	252	341	21.00	644	22018	636	756	2849	0.072	27.91	92.31
Nordegg MAIM Permit 2007 41460	58.29	32.66	5.19	2.48	1.537	3.212	271	295	20.20	256	19163	698	966	2583	0.063	28.17	90.74
Nordegg MAIM Permit 2007 41461	74.82	41.92	2.34	1.12	1.242	3.026	382	238	13.10	100	14591	377	551	1779	0.086	34.17	96.47
Nordegg MAIM Permit 2007 41462	77.64	43.50	4.60	2.20	1.082	2.479	404	222	8.30	115	13751	597	492	1335	0.079	36.55	95.88
Nordegg MAIM Permit 2007 41463	68.16	38.19	22.97	10.98	0.623	1.525	455	174	5.05	114	7906	306	107	723	0.010	41.51	98.87
Nordegg MAIM Permit 2007 41464	48.32	27.07	29.64	14.17	0.943	2.310	319	213	10.65	197	12522	334	467	1334	0.053	37.95	94.69
Nordegg MAIM Permit 2007 41465	60.48	33.88	15.40	7.36	1.045	2.479	406	235	12.92	458	14415	396	306	1508	0.085	35.35	94.90
Nordegg MAIM Permit 2007 41466	52.79	29.58	5.46	2.61	1.688	2.885	789	350	22.83	147	19062	784	1185	2051	0.598	25.93	88.55
Nordegg MAIM Permit 2007 41467	47.46	26.59	6.14	2.94	1.732	2.698	665	418	21.37	131	20665	723	1246	2229	1.150	25.22	84.31
Nordegg MAIM Permit 2007 41468	83.17	46.60	1.80	0.86	0.763	1.649	470	737	10.60	57	8600	392	713	1034	0.480	36.75	96.90
Nordegg MAIM Permit 2007 41469	75.61	42.36	8.79	4.20	0.884	1.963	469	594	8.51	69	9932	533	884	1095	0.519	37.81	97.61
Nordegg MAIM Permit 2007 41470	73.74	41.31	9.60	4.59	0.847	2.101	575	476	9.39	62	11693	418	535	1191	0.548	37.51	97.80
Nordegg MAIM Permit 2007 41471	91.35	51.18	2.89	1.38	0.552	0.747	516	254	3.45	35	3687	359	341	385	0.105	41.55	99.53
Nordegg MAIM Permit 2007 41472	92.42	51.78	2.42	1.16	0.364	0.578	453	203	3.48	22	2854	251	327	302	0.178	42.32	100.30
Nordegg MAIM Permit 2007 41473	94.15	52.75	1.84	0.88	0.245	0.481	463	148	2.52	21	2491	182	<100	267	0.137	42.42	99.79
Nordegg MAIM Permit 2007 41474	94.04	52.69	1.80	0.86	0.265	0.513	459	156	2.46	26	2484	172	204	274	0.132	42.51	99.81
Nordegg MAIM Permit 2007 41475	93.49	52.38	2.59	1.24	0.291	0.521	462	142	2.33	22	2625	172	<100	283	0.140	42.58	99.85
Nordegg MAIM Permit 2007 41476	94.81	53.12	2.16	1.03	0.237	0.372	487	119	1.97	15	1913	154	<100	204	0.094	43.04	100.16
Nordegg MAIM Permit 2007 41477	94.96	53.20	1.96	0.94	0.219	0.342	460	98	2.08	13	1676	161	<100	170	0.046	42.90	99.99
Nordegg MAIM Permit 2007 41478	95.82	53.68	1.32	0.63	0.185	0.314	484	87	1.82	15	1595	168	<100	173	0.052	43.14	100.08
Nordegg MAIM Permit 2007 41479	95.37	53.43	1.51	0.72	0.194	0.373	503	85	1.96	12	1935	217	<100	187	0.094	42.88	99.95
Nordegg MAIM Permit 2007 41480	88.57	49.63	5.86	2.80	0.412	0.704	419	152	3.25	21	3463	212	<100	452	0.163	42.15	99.58
Nordegg MAIM Permit 2007 41481	90.64	50.78	4.83	2.31	0.364	0.538	432	141	2.81	24	2581	197	<100	325	0.226	42.32	99.72
Nordegg MAIM Permit 2007 41482	93.35	52.30	3.31	1.58	0.216	0.398	502	78	2.27	16	1992	171	<100	228	0.105	42.81	99.98
Nordegg MAIM Permit 2007 41483	92.27	51.70	3.38	1.62	0.192	0.324	450	74	2.17	11	1639	147	<100	182	0.120	42.85	99.22
Nordegg MAIM Permit 2007 41484	93.40	52.33	3.67	1.75	0.230	0.373	461	80	1.78	17	1749	176	<100	197	0.085	43.17	99.99
Nordegg MAIM Permit 2007 41485	78.04	43.73	18.67	8.92	0.373	0.353	324	161	1.92	17	1583	238	<100	190	0.052	44.45	100.05
Nordegg MAIM Permit 2007 41486	75.24	42.15	22.59	10.80	0.241	0.165	287	162	1.29	11	775	268	254	80	0.045	45.14	100.02
Nordegg MAIM Permit 2007 41487	61.62	34.53	34.75	16.61	0.292	0.381	344	162	1.91	14	1517	221	<100	206	0.020	45.77	99.76
Nordegg MAIM Permit 2007 41488	56.14	31.45	40.12	19.18	0.334	0.333	220	176	2.17	12	1289	234	<100	201	0.003	46.13	99.82
Nordegg MAIM Permit 2007 41489	58.36	32.70	37.14	17.75	0.220	0.340	335	107	2.55	15	1552	243	<100	183	0.017	45.56	99.38
Nordegg MAIM Permit 2007 41490	68.47	38.36	24.06	11.50	0.264	0.982	157	104	4.26	36	3754	292	<100	482	0.036	43.17	99.06
Nordegg MAIM Permit 2007 41491	55.63	31.17	40.98	19.59	0.161	0.376	123	152	2.29	18	1286	380	<100	163	0.000	45.96	99.76
Nordegg MAIM Permit 2007 41492	54.95	30.79	43.08	20.59	0.126	0.186	83	176	1.19	10	727	257	<100	94	0.000	46.72	99.74
Nordegg MAIM Permit 2007 41493	79.11	44.33	15.88	7.59	0.141	0.422	361	72	3.38	23	1958	285	254	185	0.042	43.41	99.63
Nordegg MAIM Permit 2007 41494	54.83	30.72	43.33	20.71	0.092	0.140	114	67	1.32	7	602	253	<100	74	0.000	46.59	99.69
Nordegg MAIM Permit 2007 41495	52.87	29.62	41.85	20.01	0.225	0.555	112	69	3.55	25	2403	343	141	312	0.004	45.09	99.39
Nordegg MAIM Permit 2007 41496	52.53	29.43	42.50	20.32	0.141	0.362	105	63	3.03	14	1576	265	<100	197	0.008	45.51	99.02
Nordegg MAIM Permit 2007 41497	52.68	29.51	41.58	19.87	0.113	0.357	122	66	3.62	16	1496	337	<100	185	0.008	45.15	98.86
Nordegg MAIM Permit 2007 41498	51.82	29.03	40.51	19.36	0.201	0.612	109	76	4.78	31	2252	516	111	304	0.005	44.31	98.65
Nordegg MAIM Permit 2007 41499	57.00	31.93	36.49	17.44	0.269	0.827	170	69	3.84	24	3723	347	220	390	0.016	44.65	99.47
Nordegg MAIM Permit 2007 41500	55.40	31.04	40.85	19.53	0.151	0.321	122	67	2.33	11	1395	352	<100	158	0.008	46.20	99.79
Nordegg MAIM Permit 2007 41501	59.69	33.44	38.40	18.36	0.130	0.154	134	64	1.34	7	671	276	<100	87	0.000	46.50	100.05
Nordegg MAIM Permit 2007 41502	54.40	30.48	42.51	20.32	0.106	0.235	142	58	1.54	9	1041	369	<100	117	0.004	46.63	99.49
Nordegg MAIM Permit 2007 41503	55.13	30.89	42.24	20.19	0.121	0.288	132	66	1.59	10	1218	323	157	149	0.007	46.44	99.73

10/Can Geo/Stone  
Sample

		%	%	%	%	%	%	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	%	%	%
		CaCO3	CaO	MgCO3	MgO	Fe2O3	Al2O3	SrCO3	MnO	SiO2	BaO	K2O	Na2O	P2O5	TiO2	S	LOI	Total
Nordegg MAIM Permit 2007	41504	54.19	<b>30.36</b>	40.87	<b>19.54</b>	0.233	0.610	148	65	3.11	17	2693	360	<100	312	0.008	45.25	99.47
Nordegg MAIM Permit 2007	41505	54.20	<b>30.37</b>	42.22	<b>20.18</b>	0.161	0.381	144	68	2.10	14	1646	396	<100	175	0.007	46.28	99.72
Nordegg MAIM Permit 2007	41506	54.80	<b>30.70</b>	42.32	<b>20.23</b>	0.162	0.316	145	72	1.94	15	1428	392	<100	141	0.010	46.23	99.81
Nordegg MAIM Permit 2007	41507	57.06	<b>31.97</b>	38.84	<b>18.57</b>	0.175	0.384	124	117	2.16	13	1603	281	123	174	0.006	46.22	99.72
Nordegg MAIM Permit 2007	41508	56.88	<b>31.87</b>	40.65	<b>19.43</b>	0.146	0.257	108	176	1.22	11	1112	285	<100	131	0.006	47.01	100.12
Nordegg MAIM Permit 2007	41509	50.10	<b>28.07</b>	37.43	<b>17.89</b>	0.154	0.184	102	183	8.46	9	763	277	<100	101	0.004	42.53	97.43

## APPENDIX 4: ANALYTICAL LABORATORY INFORMATION AND TECHNIQUES

### Name and address of the Lab:

Graymont Western US inc, Central Laboratory.  
670E 3900S. Suite 200, Salt Lake City, Utah, 84107

### Statement of qualifications of the chemist:

Jared Leikam, B.S. in chemistry from the University of Utah, class of 2003. Jared started working for Graymont Western in Feb 2004 and has been working with the ICP spectrometer for one and a half years, under the direct supervision of Carl Paystrup (Lab Supervisor).

### Sample preparation , procedures, reagents, equipment, etc.:

For the ICP sample preparation, 0.5 grams of the sample is mixed with 3g of lithium carbonate. The sample and the lithium carbonate are then fused together in a muffle furnace at 850C. After the fusion process the samples are dissolved in 1:1 HCl, a total of 40ml 1:1 HCl is used in the dissolving process. The samples are then diluted to 200ml and spiked with 10ppm Co. The cobalt is used as an internal standard. At this point the samples are ready for analysis on the Perkin Elmer, Optima 3000.

### Mesh size fraction, split and weight of sample:

Upon receiving the samples, the prep room technician riffles and then splits the stone down to a manageable size (roughly 200g). The stone is then dried in an oven at 100C. Once the samples have been dried they get pulverized to a -200 mesh size. A split of this pulverized material is then sent for testing in the main part of the lab.

### Quality control Procedures:

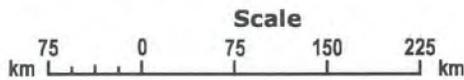
The ICP spectrometer is calibrated with two certified reference materials prior to analyzing a batch of samples. A batch typically contains 96 samples. Every 12<sup>th</sup> sample in a batch is a certified limestone reference sample. In addition to the 8 reference samples imbedded in the batch, there are 2 limestone reference samples analyzed at the beginning and at the end of the batch to ensure the accuracy of our Na and P numbers. Every element being analyzed in a sample is backed up by data from the certified reference materials. We also use an internal standard(10ppm Co) to further ensure the quality and accuracy of the analysis.



Location of  
MAIM Permits  
9396010038 &  
9302090596

**LEGEND**

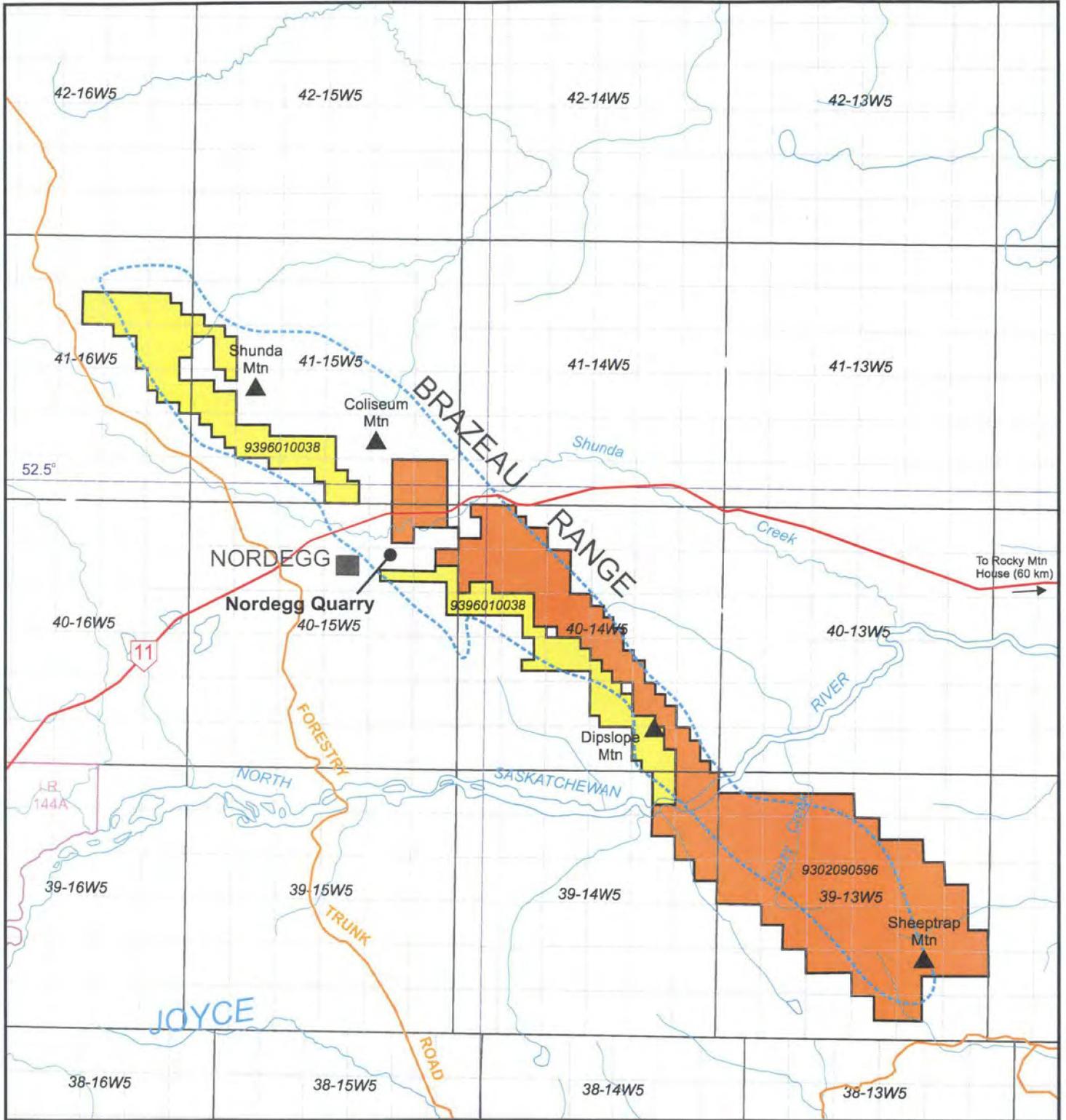
- Provincial capital
- Other populated places
- Trans-Canada Highway
- Major road
- International boundary
- Provincial boundary



GRAYMONT WESTERN CANADA INC.  
DAHROUGE GEOLOGICAL CONSULTING LTD.  
Edmonton, Alberta

BRAZEAU RANGE,  
WEST-CENTRAL ALBERTA

Fig. 3.1 Location Map



**MAIM Permits**

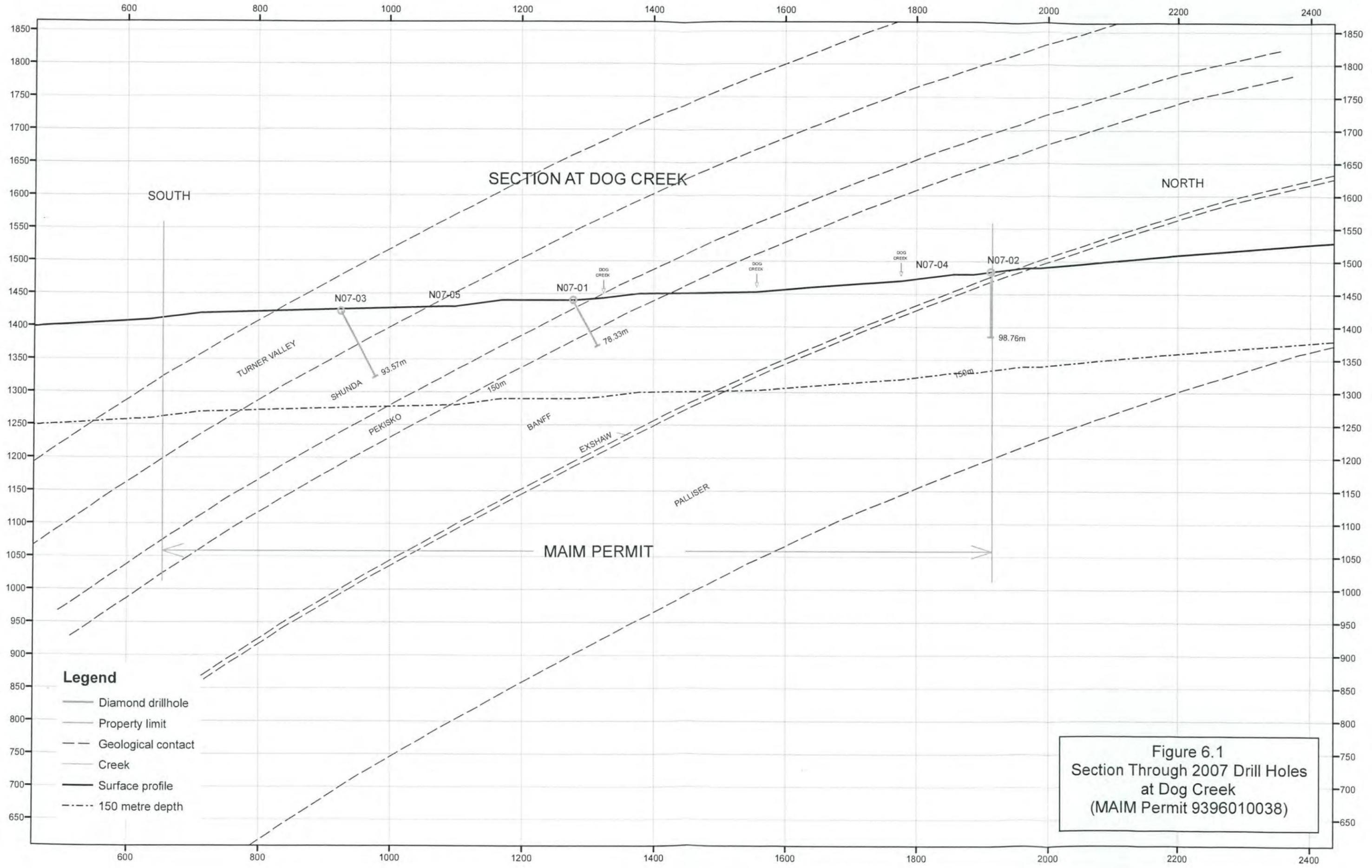
- South Brazeau  
MAIM PERMIT 9302090596
- Nordegg  
MAIM PERMIT 9396010038

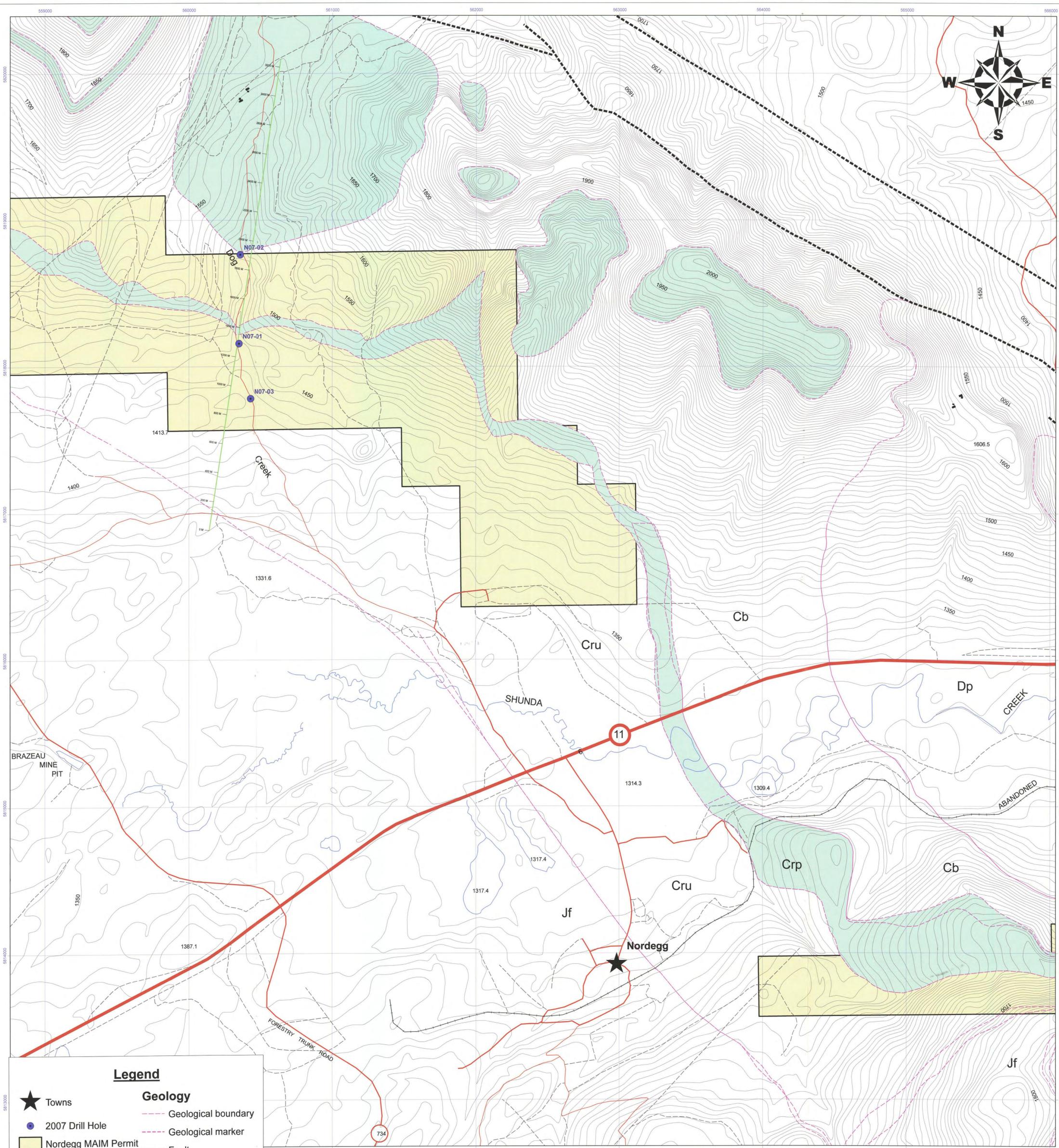
**SYMBOLS**

- Paleozoic Limestone-bearing units  
(locations approximate)
- Secondary Road
- Rough Road
- Railway



<b>GRAYMONT WESTERN CANADA INC.</b>
DAHROUGE GEOLOGICAL CONSULTING LTD. EDMONTON, ALBERTA
WEST-CENTRAL ALBERTA
Figure 4.1 MAIM Permits 9396010038 and 9302090596
PK
2008.03





**Legend**

- ★ Towns
- 2007 Drill Hole
- Nordegg MAIM Permit
- Topographic Contours
- Water bodies
- +— Railway
- Gravel road
- Driveway
- Highway 11
- - - Cut line
- Geology**
- - - Geological boundary
- - - Geological marker
- - - Fault
- Pekisko Fm.
- X-Section**
- X-Section Line
- Section Easting

Grid shown is NAD83, Zone 11

0 250 500 1,000 1,500 2,000 m

1:10,000

Contour Interval = 10 metres

Part of Tp 41, Rge 15 W5

**GRAYMONT WESTERN CANADA INC.**  
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 EDMONTON, ALBERTA  
 Nordegg MAIM Permit, Nordegg, AB

Fig. 4.2  
 2007 Drill Hole Location Map

Drawn by: P. Kluczny March 7, 2008