MAR 20040025: FIREBAG RIVER

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GRAYMONT WESTERN CANADA INC.

2004 EXPLORATION AND FIELDWORK AT THE FIREBAG RIVER METALLIC AND INDUSTRIAL MINERALS PERMITS NEAR FORT McKAY, NORTHEAST ALBERTA

Metallic and Industrial Mineral Permits:
9302090611 and 9302090612

Geographic Coordinates

57°38' N to 57°44' N
110°55' W to 111°30' W

NTS Sheets 74 E/10 and 11

2004 12 29

by

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MINING GEOLOGY
MINERAL EXPLORATION
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COAL

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consulting geologists

December 29, 2004

Attention: Hazel Hensen
Senior Administrator

Coal and Mineral Development Unit
Alberta Department of Energy
7th Floor, North Petroleum Plaza
9945 - 108 Street
Edmonton, AB T5K 2G6

Dear Hazel:

Re: Metallic & Industrial Minerals Permit Nos. 9302090611 and 9302090612

In connection with the above noted metallic and industrial minerals (MAIM) permits, we are enclosing herewith one bound copy and one unbound copy of an assessment report entitled "2004 Exploration and Fieldwork at the Firebag River Metallic and Industrial Minerals Permits, Near Fort McKay, Northeast Alberta." Dahrouge Geological Consulting Ltd. is filing the aforementioned assessment on behalf of Graymont Western Canada Inc.

The entirety of Permits 9302090611 and 9302090612 will be kept in good standing, it will not be amended. Excess expenditures, as discussed in Section 4.4 of the attached report, are to be assigned to permits 9302090611 and 9302090612.

Also attached are the following:

a) a letter of authorization for the reproduction or copying of the attached report; and
b) a letter of authorization from Graymont Western Canada Inc. authorizing Dahrouge Geological Consulting Ltd. to act on their behalf.

Please advise if you require any additional information.

Yours very truly,
DAHROUGE GEOLOGICAL

[redacted]

Jody Dahrouge, B.Sc., P.Geol.

Encl.

cc. Mr. Marc Gidluck
Graymont Western Canada Inc.
Mr. Peter Darbyshire
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December 29, 2004

Coal and Mineral Development Unit
Alberta Department of Energy
7th Floor, North Petroleum Plaza
9945 - 108 Street
Edmonton, AB T5K 2G6

Re: **Reproductions**

Dahrouge Geological Consulting Ltd. hereby authorizes the Government of Alberta to reproduce or copy the attached Assessment Report, entitled "2004 Exploration and Fieldwork at the Firebag River Metallic and Industrial Minerals Permits, Near Fort McKay, Northeast Alberta" at the end of the one year confidentiality period.

Yours very truly,
DAHROUGE GEOLOGICAL

[redacted]

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GRAYMONT

December 22, 2004

Coal and Mineral Development Unit
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To Whom It May Concern

Re: LETTER OF AUTHORIZATION

This letter authorizes Mr. Jody Dahrouge with Dahrouge Geological Consulting Ltd. to file assessment work on behalf of Graymont Western Canada Inc.

Yours truly,

[redacted]

Marcus J. Gidluck, P. Geol.
Division Geologist
Graymont Western Canada Inc.

cc. Jody Dahrouge, B.Sc., P.Geol.

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1. SUMMARY

During May 2003, and July and September of 2004 areas north of Fort McKay, along Athabasca, Firebag and Marguerite rivers, were explored for high-quality carbonate rocks. At depth, the permits are underlain by Paleozoic carbonate units within the Devonian Waterways Formation, Slave Point Formation and upper Elk Point Group.

Exploration work included the use of aerial photographs and a helicopter to locate rock outcroppings. In addition, manual augers and an ATV-mounted percussion drill were employed in an attempt to determine the thickness of unconsolidated overburden at various locations throughout the property. A total of 23 holes were bored with manual augers, and 10 with an ATV-mounted percussion drill. Additional work included the collection of soil/till at the depth of auger and drill holes, and the investigation of a limited number of sections where representative outcrop or float was available. Very few outcrops are located at and near the permits, as they are covered by a thick sequence of unconsolidated sands. Most outcrops are located near valley bottoms, and generally consist of dolomites of the Methy Formation within the upper Elk Point Group. All auger and percussion holes failed to penetrate the thick sequences of unconsolidated sands, which locally exceeded 12 metres.

2. INTRODUCTION

During the spring of 2003, and summer of 2004, Dahrouge Geological Consulting Ltd. on behalf of Graymont Western Canada Inc., conducted exploration for high-quality carbonate lithotypes within north-east Alberta. This assessment report describes the exploration conducted within MAIM (Metallic and Industrial Minerals) permits 9302090611 and 9302090612 near Firebag River, northeast Alberta. It includes information on the geology of locations examined in 2003 and 2004; as well as, a brief interpretation of the results. Auger holes were completed throughout the area in an attempt to ascertain the thickness and content of unconsolidated overburden. Peter Darbyshire, Vice President and General Manager for Graymont Western Canada Inc. authorized this work.

3. GEOGRAPHIC SETTING

The Firebag River MAIM permits encompass an area about 70 km north of Fort McKay, within northeastern Alberta. Fort McKay is about 55 km west of the Alberta-Saskatchewan border and 60 km north of Fort McMurray, which is accessible by a 437 km paved highway from Edmonton.

During the summer months the permits are accessible by ATV along the winter road to Fort Chipewyan, which begins at the northern end of Highway 63, about 50 km north of Fort McKay. All supplies and resources, including fuel and groceries, are available in the city of Fort McMurray, located at the confluence of Athabasca and Clearwater rivers, within northeastern Alberta.

A temporary camp was set up at a Provincial Campground located about 1 km north of Firebag River. The campsite was within about 100 m of the winter road. The camp was not located directly on the property but was in an excellent location for accessing various parts of the permits.

The permits include parts of the Athabasca, Firebag and Marguerite rivers, which create topographically lower valleys with slumping along their banks. The valley bottoms have gentle relief and are generally covered by a veneer of unconsolidated, fluvial silts, sands and gravels. Areas surrounding the river valleys are relatively flat with shallow slopes. Outcrop exposure within the area is poor, and is restricted to a few banks along the Athabasca and Firebag rivers. Most of the area is covered by Quaternary surficial deposits of preglacial, glacial and postglacial sediments.

Within well-drained areas, vegetation commonly consists of boreal forest cover, including white spruce, aspen and jack pine. Within lower areas along the river valleys and muskegs, vegetation includes a mix of deciduous and coniferous trees, including black spruce, willow, birch and sphagnum moss.

In the Fort McMurray area, mean annual snowfall is 47.2 inches and mean annual precipitation is 16.32 inches. River breakup generally occurs in the third week of April. On rare occasions ice-jam floods can occur; since 1985 there have been 10 recorded floods.

For ease of geographic reference, informal names have been applied to MAIM permits, ridges, creeks, rivers and other unnamed features on published maps.

4. PROPERTY, EXPLORATION AND EXPENDITURES

4.1 METALLIC AND INDUSTRIAL MINERALS PERMITS

In 2002, Graymont Western Canada Inc. acquired MAIM permits 9302090611 and 6302090612 north of Fort McKay, Alberta (Table 4.1). The permits include portions of Athabasca, Firebag and Marguerite rivers.

Based on exploration conducted in 2003 and 2004, the entirety of the MAIM permits will be retained.

TABLE 4.1 DESCRIPTION OF METALLIC AND INDUSTRIAL MINERALS PERMITS

Permit	Comm. Date	Expiry Date	Land Description (Tp-RW4)	Size (Ha)
9302090611	September 16, 2002	September 16, 2004	100-8W4 (Sections: 25 through 36) 100-7W4 (Sections: 25 through 36) 100-6W4 (Sections: 19-21, and 28-33)	8,448
9302090612	September 16, 2002	September 16, 2004	100-9W4	9,216
			TOTAL	17,664

4.2 2003 EXPLORATION

During a visit to the area in May of 2003, a single measured section was collected a few kilometres downstream of where the winter road crosses Firebag River. The section was beyond the boundaries of the MAIM permits, and represented a 2 m stratigraphic interval of the Methy Formation within the upper Elk Point Group.

TABLE 4.2 2003 MEASURED SECTION DESCRIPTION

Interval	Formation	UTM (NAD 83) Easting	UTM (NAD 83) Northing	Stratigraphic Thickness (m)	Description
18672	Methy	487949	6389851	2	Dolomite, grey weathered, brown fresh, thin bedded, *sucrosic; relic bioclasts on* weathered surfaces, attitude of beds 94°/04°N

4.3 2004 EXPLORATION

The Firebag River permits were examined in July and September, 2004 by Dahrouge Geological Consulting Ltd. on behalf of Graymont Western Canada Inc. A brief visit in July of 2004 involved searching for outcrops with the use of a helicopter. Three discrete outcrops were identified either at the permits, or bordering onto them. The sections were all described as dolomite, and are representative of the Methy Formation of the upper Elk Point Group (Appendix 2).

A more extensive exploration program was conducted between September 4th to the 13th. A camp was set up near the permit area, central to various quad access trails.

A total of 23 manual auger drill holes were completed within the Firebag River MAIM permits. The manual auger was used in areas accessible by foot or helicopter in order to test the thickness of unconsolidated overburden throughout the permits. Depending on the type of material being tested, the manual auger had a depth limitation of approximately 3 to 5 m. In cases where bedrock was not reached, holes had to be abandoned due to the sub-surface collapsing (typically

unconsolidated sand or due to in-filling water). Holes also had to be abandoned when sequences of thick clay or coarse gravel were encountered. An assumption was made that when a hard, impenetrable surface was encountered, bedrock had been reached. However, it was not always possible to determine the character of the hard surface. Given the foregoing, the depth-to-overburden values for the manual auger were treated as minimum estimates. The auger program included the examination of 7 unconsolidated intervals at auger depth.

The ATV-mounted percussion drill was used in areas of easy access and where the overburden thickness was suspected to be greater than a few metres. The drill had a depth range of approximately 12 m. Deeper holes were often abandoned, as recovering the drill stems to the surface became more difficult with increasing depth. When the drill encountered an arbitrary amount of resistance, it was assumed that bedrock was encountered. As with the manual auger holes, overburden depths were not considered entirely dependable due to the reported presence of erratic boulders with diameters of over 1 metre (Smith and Fisher, 1993).

Drill and auger hole locations, accompanied by overburden descriptions are available in Appendix 3. In September, four discrete locations were investigated throughout the property; only one from outcrop. Descriptions are in Appendix 2.

4.4 EXPLORATION EXPENDITURES

During 2003 and 2004, exploration expenditures for MAIM Permits 9302090611 and 9302090612 totalled $95,047.91.

TABLE 4.3 ASSIGNMENT OF EXPENDITURES

Assessment Period	Expiry Date	Required Expenditures	Assigned Expenditures
Years 1 & 2	Sept. 16/04	$88,320.00	$88,320.00
Years 3 & 4	Sept. 16/06	$176,640.00	$6,727.91
		Total:	$95,047.91

5. REGIONAL GEOLOGY

The geology and stratigraphy of northeastern Alberta has previously been described by Carrigy (1959), Norris (1963), Holter (1976), and Cotterill and Hamilton (1995).

In northeastern Alberta, the sedimentary cover consists primarily of Paleozoic carbonates, evaporites and clastics, overlain unconformably by Mesozoic siliciclastics (Table 5.1). Devonian

and Cretaceous stratigraphy thins to the north-east, as it onlaps with the Precambrian basement. In the Fort McMurray area, the Precambrian basement is at depths of 250 to 300 m and has a southeasterly regional slope of about 5.5 m per km (Halferdahl, 1985). The Precambrian basement is overlain by middle Devonian strata of the Elk Point Group, followed by the Beaverhill Lake Group, and further west, the Woodbend Group. In turn, the Devonian is unconformably overlain by Cretaceous sediments of the Mannville, La Biche and Smoky Groups. The oil-sands of the McMurray Formation are within the lowest part of the Mannville Group.

Above the Cretaceous siliciclastics is a variety of unconsolidated Quaternary sediments. Near Fort McMurray there is a basal diamicton derived from the Laurentide Ice Sheet, which is overlain by gravel, sand and clay from glacial Lake McMurray (Fisher and Smith, 1993). Spillway deposits, common in the river valleys, consist of poorly sorted boulder-gravel-sand, with blocks of oil-sands and glacio-lacustrine sediments. Smith and Fisher (1993) interpret the spillway deposits as a result of a high-velocity flood, sourced from Glacial Lake Agassiz in northern Saskatchewan.

5.1 QUATERNARY GEOLOGY

Within the vicinity of Firebag River, the landscape has been shaped by glacial and post-glacial activity with the majority of surficial cover as the result of outwash sands, and some minor aeolian dune sands and meltwater sediments (Fig's 5.1 and 5.2). The outwash sands are generally medium- to coarse-grained with pebbles and small gravel lenses; the aeolian sands are described as medium-grained quartz-rich sands. Meltwater channel sands and gravels are present along Athabasca River, consisting of medium- to coarse-grained sand, and various gravels.

McPherson and Kathol (1977) created a drift thickness map of the Fort McKay area (Fig. 5.1). Data was compiled from existing holes that were drilled for coal, petroleum and groundwater. Although the data was sparse for the Firebag River area, the map provides useful estimates for drift thickness.

5.2 STRATIGRAPHY

The sedimentary succession of northeastern Alberta comprises a lithologically diverse suite of Devonian carbonates, clastics and evaporites, which are unconformably overlain by Cretaceous siliciclastics. Of the stratigraphic units in Table 5.1, carbonates are present within the Methy Formation, the Slave Point Formation, the Waterways Formation, and the Woodbend Group (Fig. 5.3).

TABLE 5.1 GENERALIZED PALEOZOIC STRATIGRAPHY OF THE FORT MCMURRAY AREA, NORTHEASTERN ALBERTA*

System or Subsystem	Group	Formation	Member
Quaternary			
Upper Cretaceous	Smoky		
	La Biche	La Biche	
		Shaftesbury	
Lower Cretaceous	Mannville	Grand Rapids	
		Clearwater	Wabiskaw
		McMurray	
Upper Devonian	Woodbend	Grosmont	
		Ireton	
		Cooking Lake	
	Beaverhill Lake	Waterways	Mildred
			Moberly
			Christina
			Calumet
			Firebag
Middle Devonian		Slave Point/ Fort Vermillion	
	Upper Elk Point	Watt Mountain	
		Prairie Evaporite	
		Methy/Winnipegosis	
	Lower Elk Point	Meadow Lake/ McLean River/Contact Rapids	
Lower Paleozoic		La Loche/ Granite Wash	
Precambrian			

* Modified after Halferdahl (1985); Cotterill and Hamilton (1995)

~~~~ Erosional Unconformity

— — Paraconformity

----- Paraconformity?

5.2.1 Methy Formation

The Methy Formation is within the upper Elk Point Group of the Middle Devonian. The formation is a reefal to non-reefal unit containing massive to bedded dolostone, dolomitic limestone and minor anhydrite and gypsum (Cotterill and Hamilton, 1995). The Methy outcrops along Clearwater River valley, and sparsely along Firebag and Marguerite rivers. It is generally a dolomitic unit with interbedded anhydrite that has been described as calcareous or strongly calcareous (Norris, 1963).
~~~~

5.2.2 Slave Point Formation

The age of the Slave Point Formation has been debated in the past, placed within the Middle (Norris, 1963; Halferdahl, 1985) and Upper Devonian (Carrigy, 1973; Cotterill and Hamilton, 1995). Upper and lower contacts of the unit are defined by paraconformities. The Slave Point generally consists of limestone, siltstone and dolomitic limestone. It is characterized by brownish-grey, skeletal wackestones and argillaceous lime mudstones with interbedded dark-brown shale laminations (Cotterill and Hamilton, 1995). The Slave Point Formation is generally less than several metres thick near Fort McMurray.

5.2.3 Waterways Formation

Members within the Waterways Formation consist of the Firebag, Calumet, Christina, Moberly, and Mildred. The carbonates of the Waterways Formation reach a thickness of over 250 m in western Alberta, and thin toward the Precambrian exposure. The Firebag Member is at the base of the Waterways Formation, and consists of an olive-green calcareous shale. Sequences of interbedded olive-green limestone, argillaceous limestone and shale are also present; Norris (1963) notes several thin brachiopod-rich beds throughout. The Firebag maintains a relatively uniform thickness of about 50 m in the Fort McMurray area.

The Calumet Member conformably overlies the Firebag Member, and consists dominantly of limestone. Other units within the member include variable amounts of argillaceous, skeletal nodular lime mudstones and wackestones interbedded with grey-green calcareous shale (Cotterill and Hamilton, 1995). Norris (1963) notes significant brachiopod-rich beds in the Calumet Member. In the Fort McMurray area, the Calumet Member maintains a thickness of about 30 m.

The Christina Member consists dominantly of green-grey calcareous shale and conformably overlies the Calumet Member. Other lithologies within the upper section of the Christina Member include minor interbeds of argillaceous lime mudstone and occasional thin, skeletal wackestone and packstone beds. In the Fort McMurray area, the Christina Member attains a thickness of approximately 25 m.

Conformably overlying the Christina is the Moberly Member. The lower third, labelled units 28 to 37 by Norris (1963), of the Moberly Member consists of an alternating sequence of light olive-green, rubbly, thinly-interbedded, variably argillaceous limestones and shales, and hard beds of pale-brown, cryptograined limestones. The upper two-thirds, units 38 to 57, consist of thicker units of light- to dark-olive-green, variably calcareous shale, and thinner units of rubbly, variably

argillaceous fragmental limestone. The Moberly Member attains a thickness of about 60 m in the Fort McMurray area.

The uppermost member of the Waterways Formation is the Mildred Member. This unit is characterized by variably argillaceous, nodular lime mudstone and calcareous shales. A thickness of 40 to 45 m is maintained by the Mildred Member.

5.2.4 Woodbend Group

The Woodbend Group consists of limestones from the Grosmont, Ireton, and Cooking Lake formations. The majority of examined Grosmont Formation limestones in the Fort McMurray area are dolomitic with minor anhydrite (Halferdahl, 1985). The underlying Ireton Formation has been described as an argillaceous, medium- to coarse-grained limestone accompanied by limey shale. Some limestones of the Cooking Lake Formation have been noted as dolomitic and argillaceous (Halferdahl, 1985).

5.3 STRUCTURE

The Devonian and Cretaceous sedimentary sequences onlap onto the Precambrian cratonic platform, forming two eastwardly converging sedimentary wedges. The southwest regional dip of the Devonian strata follows the contour of the underlying Precambrian basement, which has an apparent northwest strike and southwest dip. Near Fort McMurray the Precambrian basement is at depths of between 250 to 300 m and has a southwesterly regional slope of about 5½ m per km (Halferdahl, 1985).

The westward dipping wedge of Devonian and underlying sediments rest unconformably on the Precambrian basement. The Devonian sediments are younger to the west. The top of the wedge is marked by an erosional surface that is overlain by Lower Cretaceous strata (Section 5.1). Structural complexities within the sedimentary succession are thought to be due to salt dissolution of the Lower Devonian evaporites. The result is a set of small scale domes, basins and folds, with amplitudes of between 15 and 30 m. Topographic structures of the sub-Cretaceous unconformity are due to differential erosion of the underlying Devonian sediments. The result is a generally northward trending set of ridges and valleys.

6. PERMIT GEOLOGY

6.1 MEASURED SECTIONS

A single section measured in May of 2003, was located along Firebag River, a few kilometres downstream of the winter road, and beyond the limits of the permits (Fig. 6.1). The section represented a 2 m stratigraphic interval of the Methy Formation of the upper Elk Point Group. The interval was described as grey weathered, brown fresh, sucrosic, and thin-bedded dolomite.

Along the eastern boundary of the permits, five sections were examined along Marguerite River in July, 2004 (Appendix 2; Fig. 6.1). They were identified as dolomite of the Methy Formation, of the upper Elk Point Group. The rocks were generally dark-grey weathered, brown-grey fresh, microcrystalline, and thinly-bedded to massive. An outcrop was identified further north along Marguerite River, at the northern edge of the permits, but it was inaccessible by helicopter.

A section of McMurray tar sands was discovered near the top of Teardrop Ridge, a teardrop-shaped ridge in the western portion of the permit area. The outcrop represented about 2¼ m of stratigraphy and consisted of black, loosely consolidated, coarse-grained material. The conglomerate contained rip-up clasts; as well as, a variety of other angular to rounded pebble-sized clasts.

Three locations visited in September were of the Methy Formation, or the Firebag Member of the Waterways Formation. A solution of 5% hydrochloric acid was used in the field to assess the character of the carbonates encountered. One section consisted of float, in an area with suspected shallow overburden due to the presence of abundant carbonate boulders. The float was rusty weathered, grey fresh, platy, microcrystalline and did not react with HCl. A second section may have been from cuttings of a past oil/gas well and was described as grey to bluish-grey limey breccia. The third section was a suspected subcrop of calcareous sand boulders within Cretaceous channel sands, located downslope from the McMurray sand sample of Teardrop Ridge. The sand boulders were tan-grey mottled, rusty brown weathered, and had a poor to moderate reaction with HCl.

6.2 QUATERNARY GEOLOGY

There is little outcrop within the permits or immediate vicinity. Numerous locations examined throughout the permits, interpreted as possible outcrops from aerial photographs, were identified as sand. Based on the Fort McKay area drift thickness map (Fig. 5.1) of McPherson and Kathol (1977), the permit areas generally contain overburden thicknesses of less than 20 metres.

The majority of examined material in September of 2004 consisted of unconsolidated clays, silts and sands from the depths of auger and ATV-mounted drill holes. Generally, the sediments encountered were well sorted, quartzose, medium- to coarse-grained sands, likely glacial outwash, or post-glacial aeolian sands. Thin horizons (less than 2 cm) of pink, rusty-brown, or black clays were not uncommon within the auger and drill holes. Gravel beds and poorly sorted tills were rare.

6.3 STRUCTURE AND STRATIGRAPHY

The permit area has been mapped as underlain by middle and late Devonian-aged rocks. Calcareous outcrops of interest near the Firebag River permits have been identified as either the Methy Formation of the upper Elk Point Group, the Slave Point Formation or the Firebag Member of the Waterways Formation.

More work is required to accurately assess the structure of the permit area.

7. CONCLUSION

In 2003 and 2004, MAIM permits 9302090611 and 9302090612 were explored for the presence of middle and late Devonian carbonates. Overburden test holes, completed with manual augers and an ATV-mounted percussion drill, were used to estimate the thickness of unconsolidated overburden atop the Devonian limestones.

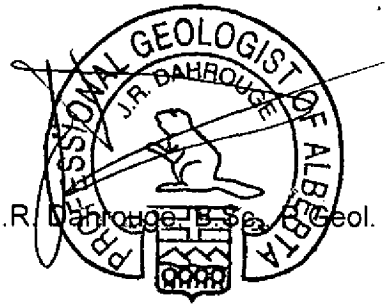
Very limited outcrop exists within the permit area. A section of outcrop was examined in May of 2003 along the Firebag River outside the permits. The section was dolomite of the Methy Formation, of the upper Elk Point Group. Five sections were examined in July, 2004 along Marguerite River at the eastern edge of the permits. The sections were dark-grey weathered, brown-fresh, microcrystalline dolomite of the Methy Formation. An outcrop was noted along Marguerite River at the northern edge of the permits but it was not examined due to the lack of helicopter accessibility.

A limestone subcrop was examined along the slope of Teardrop Ridge, described as tan-grey mottled, rusty brown weathered with a poor to moderate reaction with HCl. Near the southern edge of the property, two sections, likely Firebag Member, were examined. One contained rusty weathered blocks; they were grey fresh, platy, microcrystalline and had no reaction to HCl. The other was potential cuttings from a former oil/gas well, identified as grey to bluish-grey limey breccia.

Diamond drilling is recommended on the permit property as a next phase of exploration to accurately determine the depth of overburden to the underlying carbonates, and the quality of the subsurface rocks.

[redacted]

J. Tanton, B.Sc., G.I.T.



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

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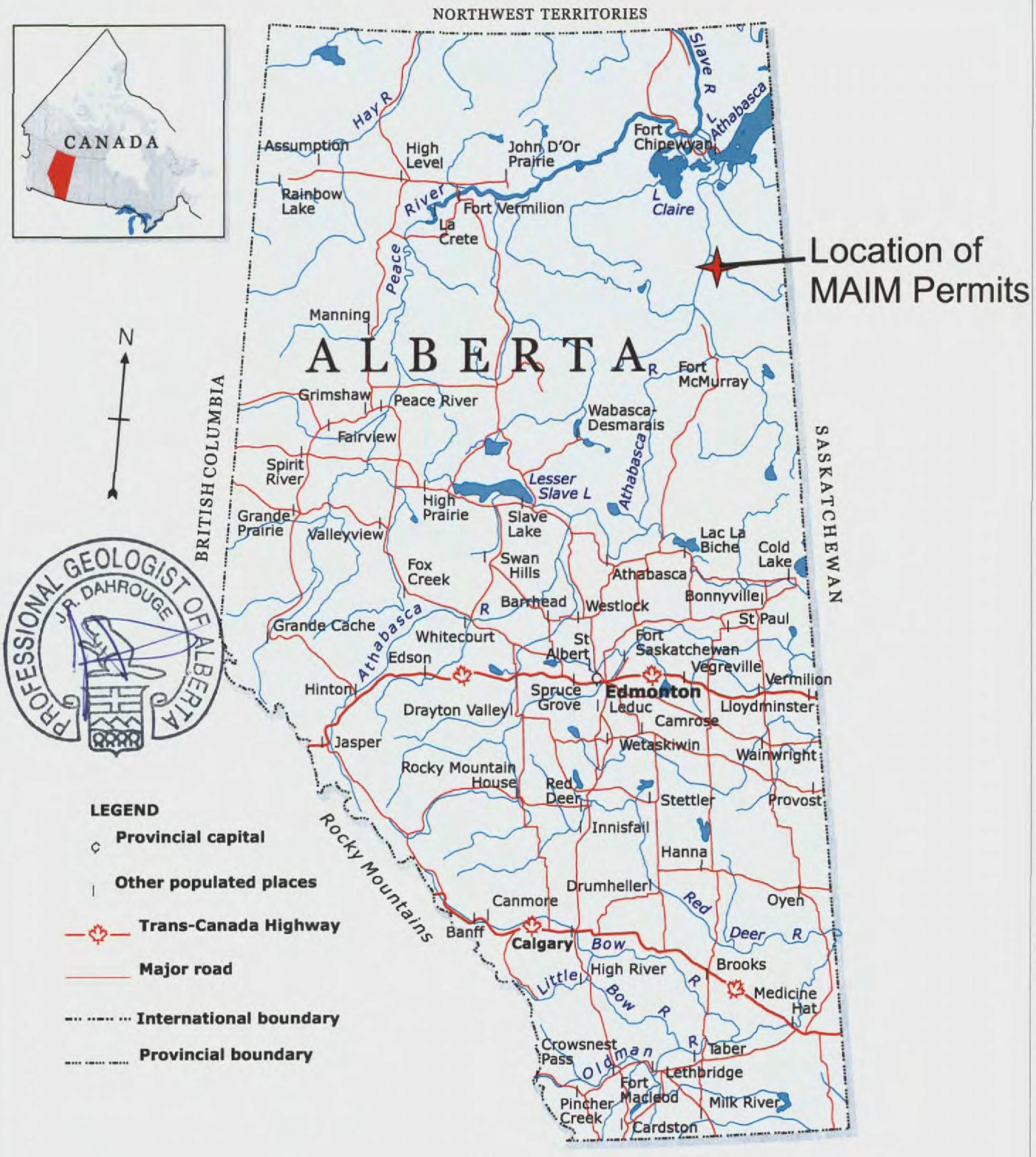

GRAYMONT WESTERN CANADA INC.

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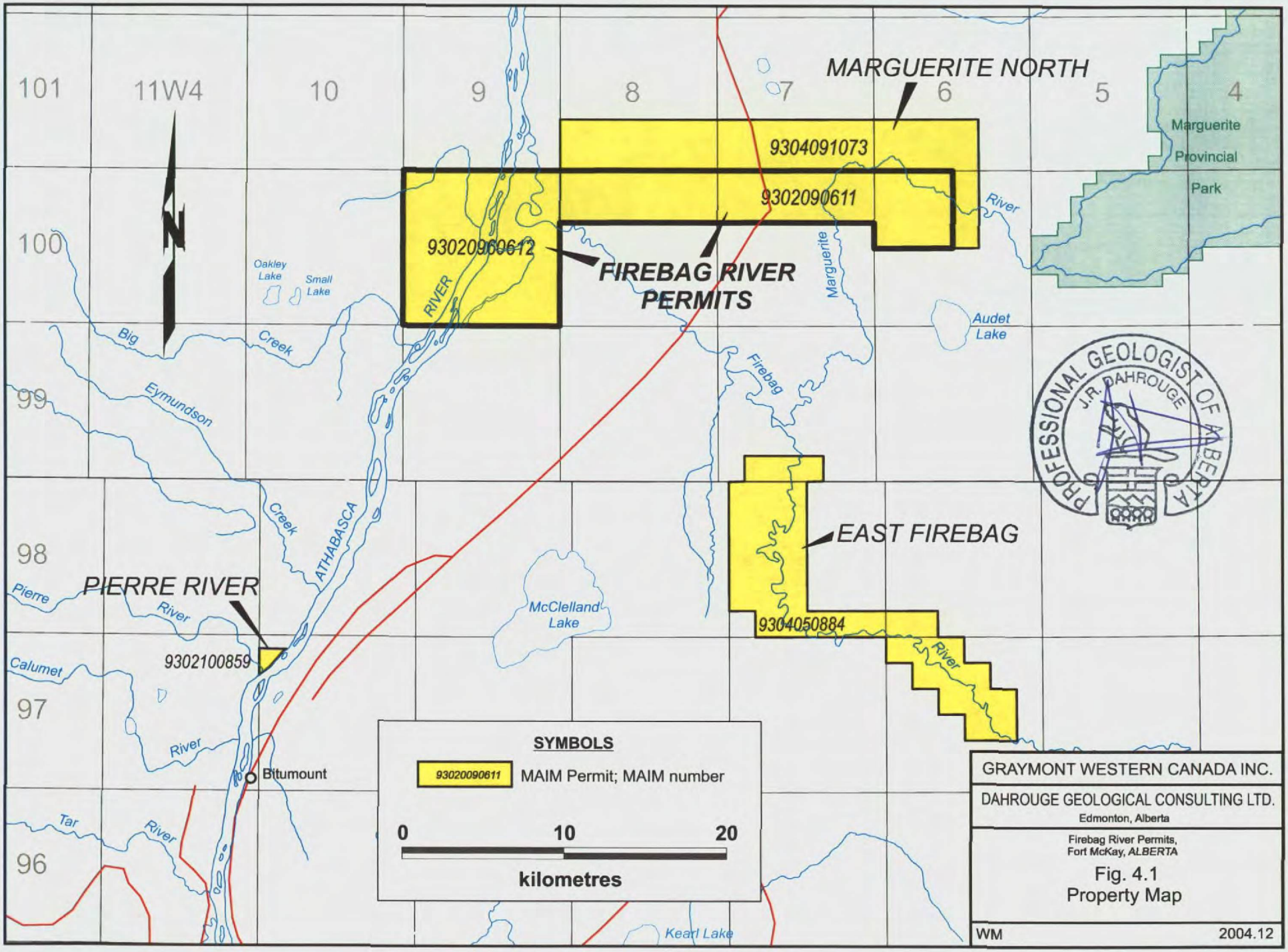
Edmonton, Alberta

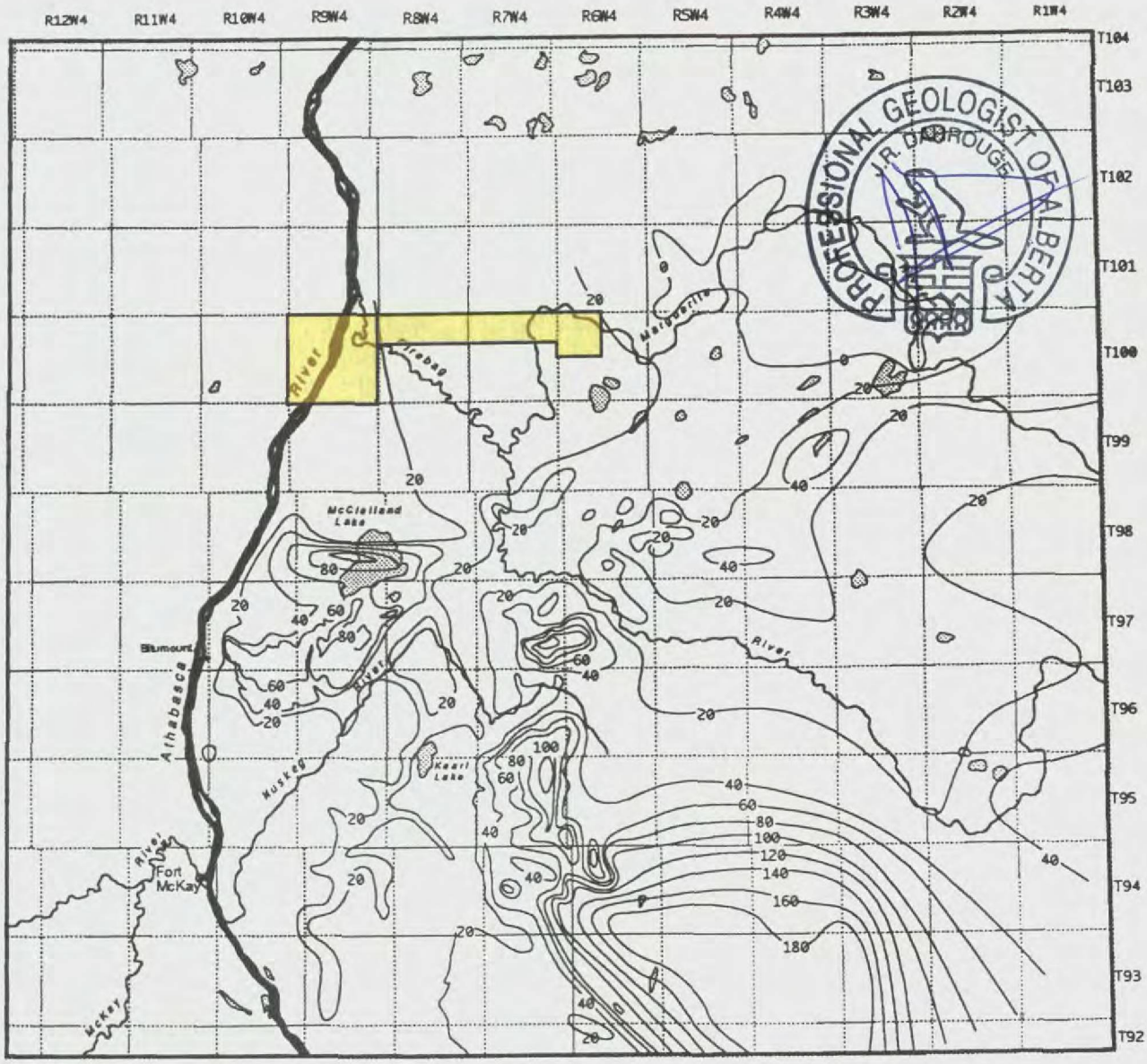
Firebag River Permits,
NORTHEASTERN ALBERTA

Fig. 3.1 Location Map

NM 2004.12


MARGUERITE NORTH
9304091073
9302090611
93020900612
FIREBAG RIVER PERMITS
EAST FIREBAG
9304050884
PIERRE RIVER
9302100859
101
11W4
10
9
8
7
6
5
4
100
99
98
97
96
Marguerite Provincial Park
Oakley Lake
Small Lake
Big Creek
Eymundson
Creek
ATHABASCA RIVER
Marguerite River
Audet Lake
Firebag
Pierre River
Calumet River
Tar River
McClelland Lake
Kearl Lake
Bitumount
PROFESSIONAL GEOLOGIST OF ALBERTA
J.R. DAHROUGE
SYMBOLS
93020090611 MAIM Permit; MAIM number
0 10 20
kilometres
GRAYMONT WESTERN CANADA INC.
DAHROUGE GEOLOGICAL CONSULTING LTD.
Edmonton, Alberta
Firebag River Permits,
Fort McKay, ALBERTA
Fig. 4.1
Property Map
WM 2004.12

F2



0 4 8 12 16 20 km

SCALE

Symbols

Firebag River Permits of Graymont Western Canada Inc.

Drift Thickness Contour (Contour Interval = 20 m)

*From Open File 1977-4; McPherson and Kathol

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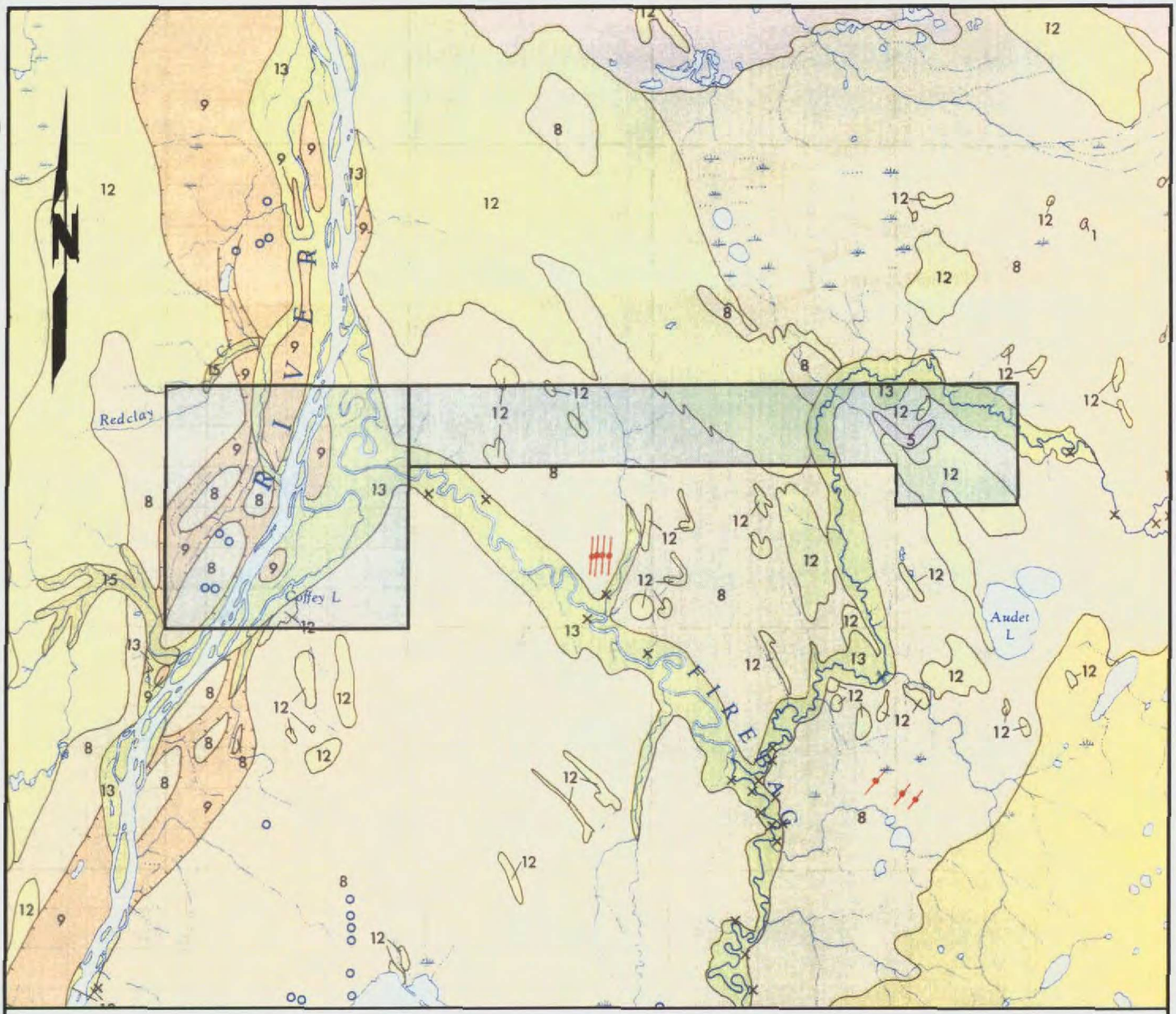
Firebag River Permits,
Fort McKay Area, ALBERTA

Fig. 5.1
Drift Thickness Map

JT 2004.12



Symbols

- Firebag River Permits of Graymont Western Canada Inc.
- 5 Ice-contact Deposits
- 8 Outwash Sand
- 9 Meltwater Channel Sediment
- 12 Aeolian Sand, Dunes
- 13 Stream Alluvium
- × Bedrock Outcrop (not Precambrian)
- Glacial Fluting
- ○ Sink hole
- Channel scarp (ticks indicate downslope side)

0 2 4 6 8 10 km
SCALE

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*Map from Department of Energy, Mines and Resources; Surveys and Mapping Branch, Alberta Department of Highways and Transport; Surficial Geology Bitumont NTS 74E. (Bayrock, 1971)

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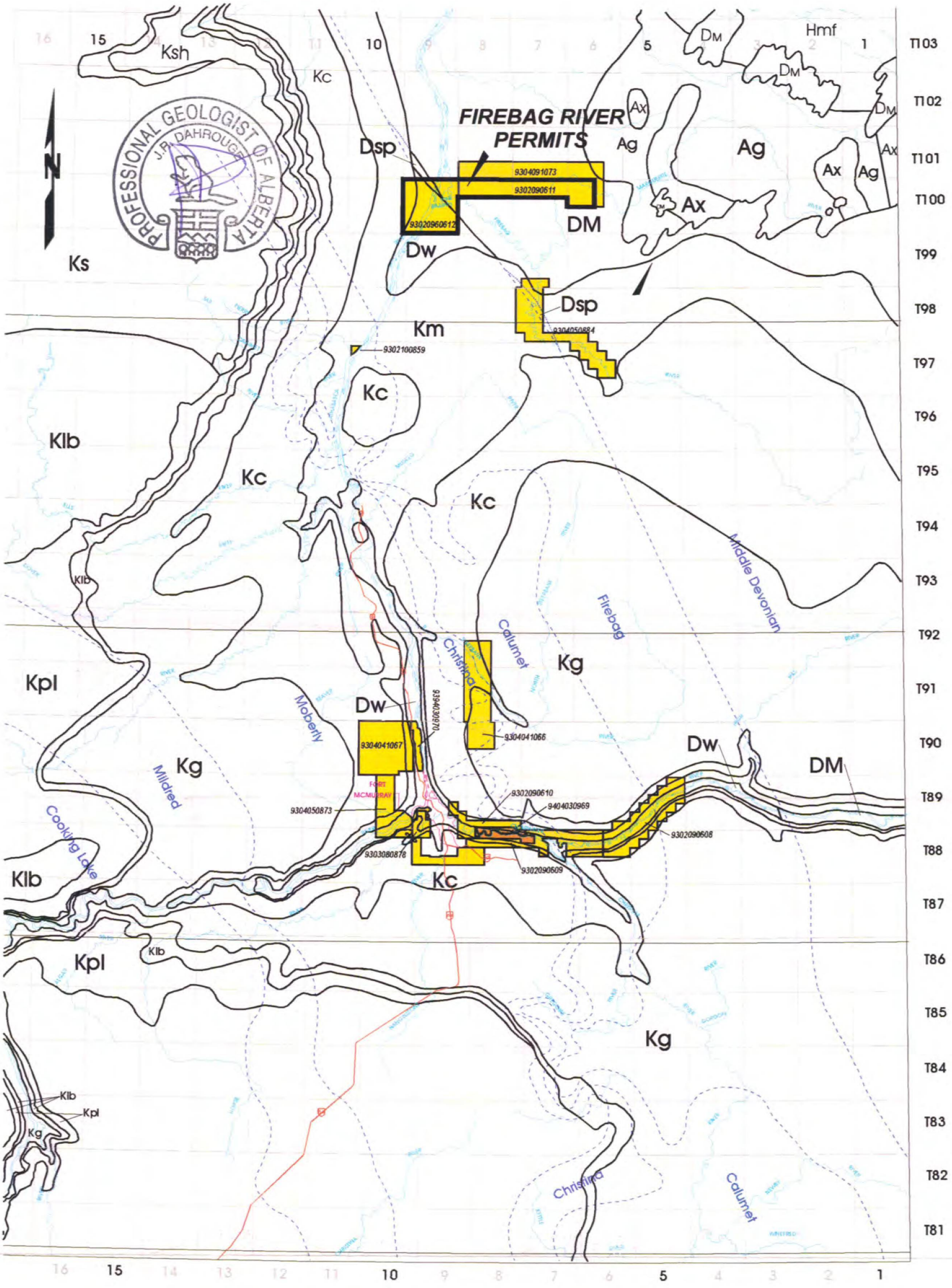
Firebag River Permits,
Fort McKay Area, ALBERTA

Fig. 5.2
Surficial Geology

JT 2004.12



Legend

CRETACEOUS
- Klb - LaBiche Formation
- Kj - Joli Fou Formation
- Kac - Alice Creek Tongue, Grand Rapids Formation
- Kg - Grand Rapids Formation
- Kc - Clearwater Formation
- Km - McMurray Formation
- Ksh - Shaftesbury Formation

DEVONIAN
- Dm - Middle Devonian
- Dsp - Slave Point Formation
- Dw - Waterways Formation

PRECAMBRIAN
- Hmf - Manitou Falls Formation
- Ag - Granitoids
- Ax - Mylonitic Rocks

Symbols

- Geological boundary
- Geological boundary (subcrop)
- Major Highway
- Rivers
- Graymont Permit/Lease location

Notes

1) Geology after Cotterill and Hamilton (1995)

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Firebag River Permits,
NORTHEASTERN ALBERTA

Figure 5.3
Regional Geology

NM 2004.12

APPENDIX 1: STATEMENT OF EXPENDITURES FOR MINERALS PERMITS 9302090611 AND 9302090612

a) Personnel

J. Dahrouge, B.Sc., P.Geol. (Geologist)
- 14.6 days — field work and travel between July 26 and 29, Aug. 15-17, Sept. 4-13, 2004
- 15.1 days — permitting, planning and preparations for field; other; preparing report

[redacted] $ [redacted]

W. McGuire (Draftsman, Field Assistant)
- 5.3 days — compile field data; drafting; prepare base maps, figures and other

[redacted] $ [redacted]

R. Grywul, B.Sc. (Geologist)
- 10.0 days — field work and travel between Sept. 4-13, 2004
- 3.0 days — prepare base map; preparations for field work

[redacted] $ [redacted]

R. Wolbaum, B.Sc. (Geologist)
- 1.6 days — field work and travel July 26 and 29, 2004
- 1.9 days — assist with organizing field gear

[redacted] $ [redacted]

N. McCallum, B.Sc. (Geologist)
- 1.6 days — field work and travel July 26 and 29, 2004

[redacted] $ [redacted]

J. Tanton, B.Sc. (Geologist)
- 10.0 days — field work and travel between Sept. 4-13, 2004
- 10.5 days — airphoto interpretation; field preparations; report preparation

[redacted] $ [redacted]

A. Wennekamp (Field Assistant)
- 9.0 days — field work and travel between Sept. 4-12, 2004
- 0.9 days — field preparations

[redacted] $ [redacted]

T. Nugent (Field Assistant)
- 9.0 days — field work and travel between Sept. 4-12, 2004

[redacted] $ [redacted]

J. Wolbaum (Field Assistant)
- 1.6 days — field work and travel July 26 and 29, 2004

[redacted] $ [redacted]

B. Dahrouge (Drill Operator)
- 13.0 days — field work and travel between Aug. 15-17, and Sept. 4-13, 2004
- 4.0 days — field preparations

[redacted] $ [redacted]

R. Vega (Assistant)
- 8.5 hours — preparing base maps, and data entry

[redacted] $ [redacted]

$ 36,362.36

APPENDIX 1: CONTINUED

b) Food and Accommodation

70.4 man-days	accommodations (camp rental and motel)	$ 5,168.34	
70.4 man-days	groceries and meals	$ 1,526.85	
			$ 6,695.19

c) Transportation

ATV:	Quad 1 Rental (Aug. 15-17, and Sept. 4-13)	$ 1,871.43	
	Quad 2 Rental (Sept. 4-13)	$ 1,353.55	
	Quads 3 and 4 (Sept. 4-13)	$ 2,648.25	
Helicopter:	Helicopter Charter (July 26 and 29, 2004)	$ 10,997.73	
Other:	Bus Fares (Ft. McMurray-Edm)	$ 131.36	
	Trailer Rentals (Sept. 4-13)	$ 1,060.49	
Vehicles:	Truck Rental (Sept. 4-13)	$ 2,281.07	
	Truck Rental (1412 km; Aug. 15-17)	$ 745.54	
	Truck Rental (1729 km; Sept. 4-13)	$ 912.91	
	Truck Rental (2199 km; Sept.4-13)	$ 1,161.07	
	Trailer and Vehicle Maintenance, Repairs	$ 1,350.78	
	Fuel (Camp, Quad and Truck)	$ 960.78	
			$ 25,474.96

d) Instrument Rental n/a

e) Drilling

Hand Augers	$ 1,906.74	
9800 - Drill Parts	$ 480.01	
9800 Series Quad Mounted Drill (Sept. 4 to 13, 2004)	$ 14,565.38	
		$ 16,952.12

f) Analyses n/a

g) Report

Reproduction and assembly	$ 55.00	
		$ 55.00

h) Other

Base map(s) and map reproductions	$ 673.90	
Courier, postage and shipping	$ 352.75	
Digital Topographic Data	$ 1,647.80	
Field Equipment	$ 2,874.33	
Field supplies	$ 3,348.05	
Long distance telephone	$ 24.12	
Satellite Telephone Rental (Sept. 4-13)	$ 587.32	
		$ 9,508.28

Total $ 95,047.91

I, Jody R. Dahrouge, hereby certify that the costs outlined above were expended for the assessment of metallic and industrial minerals permits 9302090611 and 9302090612.

[redacted]

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

JACK LAMOUREUX
COMMISSIONER FOR OATHS
COMMISSION EXPIRES
MAY 21, 2005

Commissioner for Oaths

APPENDIX 2: DESCRIPTIONS OF THE 2004 SECTIONS AT AND NEAR MAIM PERMITS 9302090611 AND 9302090612

Note: UTM coordinates are NAD83. Isolated sections are ordered from north to south, west to east

Interval	UTM Coordinates		Formation/ Member	Type	Description
	Easting	Northing			
19235-36	505638	6396608	Methy	Grab	Dolomite, dark-grey weathered, mottled, brown-grey fresh, microcrystalline; float within the Marguerite River
19237	505638	6396608	Methy	Grab	Dolomite, as per 19235-36, subcrop along river bank
19255-56	505701	6396513	Methy	Chip	Dolomite, grey weathered, tan-brown fresh, microcrystalline, massive; some small vugs, no reaction with HCl
14926	474597	6388285	Firebag(?)	Grab/Float	Dolomite(?), rusty weathered blocks, grey fresh, platy, microcrystalline; no reaction with HCl
14927	478085	6388377	Firebag(?)	Grab	Limey Breccia, Float/Cuttings from oil/gas well; grey to bluish-grey
14929	477954	6395111	McMurray	Grab	Bitumen soaked Sandstone or Pebbly Conglomerate with some rip-up clasts
14930	477999	6395080	(?)	Grab	Subcrop/Float, tan-grey mottled, rusty brown weathered, calcareous sands, poor to moderate reaction with HCl

APPENDIX 3: DESCRIPTIONS AND LOCATIONS OF OVERBURDEN TEST HOLES WITHIN MAIM PERMITS 9302090611 AND 9302090612 (Fig. 6.1)

Note: UTM coordinates are NAD83.

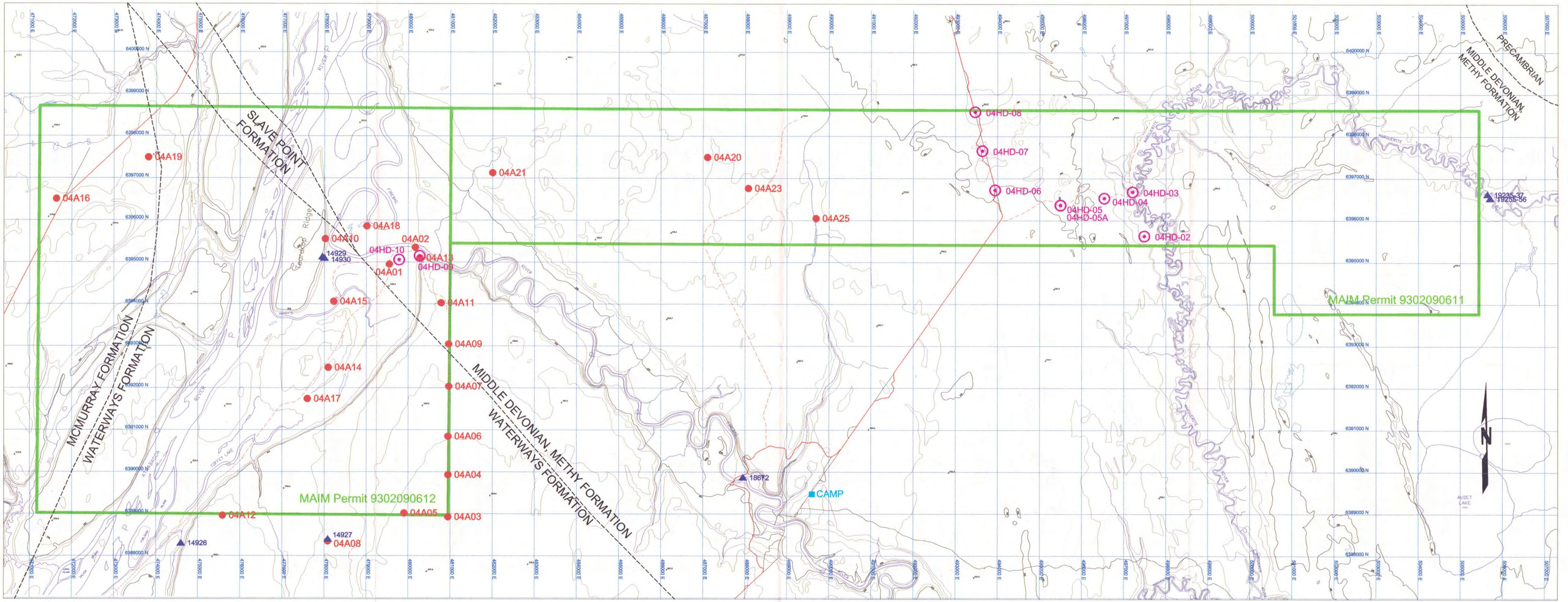
Drillhole	UTM Coordinates		Hole	Comments	
	Easting	Northing	Depth (m)	Hole Bottom	Other
MANUAL AUGER HOLES					
04A01	479550	6394950	5.80	Slowed: Caving in	top 2m: clay/soil, 2-5.8m: organic, stained, coarse sand
04A02	480167	6395350	4.85	Slowed: Caving in	coarse clean sand
04A03	480945	6388928	4.80	Slowed: Caving in	coarse to very coarse sand
04A04	480948	6389929	4.60	Slowed: Caving in	coarse to very coarse sand
04A05	479904	6389016	5.10	Slowed: Caving in	coarse rusty-brown sand, harder sand with mud layers near base
04A06	480947	6390847	6.70	Slowed: Caving in	coarse rusty-brown quartzose sand
04A07	480964	6392036	5.50	Slowed: Caving in	coarse to very coarse sand, clay layer @ ~5m
04A08	478082	6388347	2.25	Water, Collapsing	coarse rusty quartzose sand
04A09	480959	6393045	4.50	Slowed: Caving in	coarse to very coarse sand, pink clay-rich mud @ ~1m & 4.3m
04A10	478846	6395082	4 holes @ 1.0	Hit Rock (Tar Sands)	soil & sand
04A11	480784	6394028	4.75	Slowed: Caving in	medium to coarse sand
04A12	475587	6388960	3.20	Hit Rock	0-2.9m: quartz-feld. Coarse rusty-brown sand 2.9-3.2m: dark-brown stained sand, similar to previous (McMurray?)
04A13	480276	6395098	2.35	Hit Rock	loamy sand & medium to coarse sand
04A14	478094	6392480	4 holes @ 0.25	—	not described
04A15	478223	6394062	4.00	Hit Rock	wet, very fine-grained sand & very sticky clay
04A16	471630	6396506	2 holes @ 1.5	Water, Collapsing	coarse quartz/feld. Sands
04A17	477598	6391740	2.90	Wet	muddy clay
04A18	479009	6395858	2.90	—	not described
04A19	473820	6397495	4.15	Slowed: Caving in	coarse sand
04A20	487108	6397500	3.90	Water, Collapsing	coarse rusty-brown or rusty-grey sand
04A21	482010	6397118	2 holes; 1.9 & 2.0	Hit Rock in both holes	medium sand, very fine to fine-grained sand at depth
04A23	488073	6396762	1.20	Water, Collapsing	medium to coarse sand
04A25	489691	6396048	2.20	Water, Collapsing	fine to medium sand
ATV MOUNTED PERCUSSION DRILL					
04HD-02	497483	6395631	7.6	Depth Limit	Overburden: Quaternary Sands?, McMurray Fm
04HD-03	497201	6936681	7.3	Depth Limit	McMurray Fm watersands? & tarsands
04HD-04	496532	6396532	8.4	Depth Limit	no soil, McMurray? Sands
04HD-05	495492	6396367	6.8	Depth Limit	Sand; Hole moved due to poor hole condition for core sample recovery
04HD-05A	495492	6396367	7.3	Depth Limit	2 pipes lost with core barrel & parts
04HD-06	493938	6396726	6.6	Depth Limit	McMurray Fm? Sands
04HD-07	493636	6397661	9.0	Depth Limit	no soil, Overburden: Quaternary Sands?, McMurray Fm
04HD-08	493464	6398580	9.1	Depth Limit	no soil, Overburden: Quaternary Sands?, McMurray Fm
04HD-09	480270	6395148	7.3	Depth Limit	no soil, Sand & cobbles
04HD-10	479782	6395056	7.7	Depth Limit	Swampy at surface, Till; Drill stuck for 2 days

APPENDIX 4: 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.

J. Tanton 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.



GEOLOGY

WATERWAYS FORMATION: argillaceous limestone, grey shale

SLAVE POINT FORMATION: grey and brown limestone, siltstone, dolomitic limestone

MIDDLE DEVONIAN, METHY FORMATION: dolomitic limestone, minor anhydrite and gypsum

SYMBOLS

MAIM permit

Geological boundary (approx.)

Cut Line, Trail (Access Uncertain)

Road

Manual Auger Hole ● 04A01

ATV-mounted Drill Hole ⊙ 04HD-01

Examined Section ▲ 18000

NOTES

1) See Appendix 2 for Section Descriptions

2) See Appendix 3 for Test-Hole Descriptions

PROFESSIONAL GEOLOGIST OF ALBERTA J. DAHROUGE

REVISIONS	
BY	DATE
J.T.	2004.12

GRAYMONT WESTERN CANADA INC.

DAHROUGE GEOLOGICAL CONSULTING LTD.
Edmonton, Alberta

FIREBAG RIVER PERMITS, NORTHEASTERN ALBERTA

Fig. 6.1
Geology and Section Location Map

0 1 2 3 km

WM Scale: 1:50 000 2004.08