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Clearwater - A report on limestone exploration in the Clearwater range, west-central Alberta.

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GRAYMONT WESTERN CANADA INC.
877384 ALBERTA LTD.

2012 EXPLORATION AND FIELDWORK WITHIN THE CLEARWATER GROUP METALLIC AND INDUSTRIAL MINERALS PERMITS, WEST-CENTRAL ALBERTA

PART B

Metallic and Industrial Minerals Permits
9398100125, 9305090646 & 9310060379

Geographic Coordinates

51°53' N to 52°04' N
115°11' W to 115°34' W

NTS Sheets 82 O/13 and O/14, 83 B/3 and B/4

Owner:	MAIM Permit 9310060379 877384 Alberta Ltd. 18, 10509 - 81 Avenue Edmonton, Alberta T6E 1X7
Owner and Operator:	MAIM Permits 9398100125 & 9305090646 Graymont Western Canada Inc. 260, 4311 - 12 Street NE Calgary, Alberta T2E 4P9
Consultant:	Dahrouge Geological Consulting Ltd. 18, 10509 - 81 Avenue Edmonton, Alberta T6E 1X7
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Date Submitted:	October 30, 2012

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PART C

1. SUMMARY

During June 2012, parts of Limestone and Clearwater ranges, west of Rocky Mountain House and within Metallic and Industrial Minerals (MAIM) Permits 9298100125, 9305090646 & 9310060379 were explored for high-quality carbonate rocks. Exploration conducted in 2012 was a follow-up to previous exploration conducted in the area.

Access routes and outcrops were mapped, and a total of 86 rock samples were collected within the Limestone Mountain and Idlewilde Mountain permits, representing approximately 200 m of stratigraphy. Samples were sent to a laboratory for whole-rock analysis.

Throughout this report, attitudes of bedding and other planar features are given as A°/B° SW, where A° is the azimuth of the strike and B° is the amount of dip in the direction indicated (right-hand rule). A magnetic declination of 15°49' east was used. Where bedding was not evident, stratigraphic thicknesses were calculated using orientations from adjacent units. Where more than one bedding orientation was measured, the mean orientation is used.

2. INTRODUCTION

The 2012 exploration within the Clearwater Group permits was conducted by Dahrouge Geological Consulting Ltd. (Dahrouge), on behalf of Graymont Western Canada Inc. (Graymont). This assessment report describes the exploration conducted within MAIM Permits 9398100125 and 9310060379, which encompass parts of Clearwater and Limestone ranges of the Alberta Foothills. Bob Robison, exploration manager for Graymont Western U.S. Inc., authorized this work.

The objectives of the 2012 exploration were to expand on the previously explored areas, and to locate and better define carbonate units throughout the property. This report includes information on the geology and quality of carbonates encountered while mapping and sampling outcrops within the permit area.

3. GEOGRAPHIC SETTING AND ACCESS

3.1 LOCATION AND ACCESS

MAIM Permits 9398100125, 9305090646 & 9310060379 encompass areas within Limestone and Clearwater ranges, surrounding and including Limestone Mountain, Idlewilde Mountain and Marble Mountain, within west-central Alberta (Fig. 3.1).

Access to the central parts of Clearwater Range is from Rocky Mountain House, approximately 30 km southerly on Highway 22, continuing 30 km westerly on secondary road 591 to a southerly

branch of Forestry Trunk Road 734 (Fig. 3.2). This branch of Forestry Trunk Road, located about 5 km east of Burnco Quarry, continues southerly, approximately parallel to Marble Mountain at an average distance of about 3 km. ATV access to Marble Mountain is provided by cut lines running perpendicular to Clearwater Range.

From Burnco Quarry, at the south end of Corkscrew Mountain, Forestry Trunk Road 734 continues northwest along the west flank of Corkscrew Mountain and onward to the junction with Secondary Highway 752, north of Idlewilde Mountain. There it turns west and north away from the property and eventually reaches Nordegg.

Approximately 7 km northwest of Burnco Quarry along Forestry Trunk Road 734, Cutoff Creek Forestry Road heads westerly and provides access to the central part of Limestone Range, between Idlewilde and Limestone mountains. A secondary route to the Limestone Mountain area involves following Forestry Trunk Road 734 south and west from the Secondary Highway 591 intersection, past Marble Mountain, for approximately 45 km. At this point the Limestone Mountain Service Road, which is maintained by Shell Canada Ltd., can be followed north for approximately 30 km to reach the southwestern part of the property.

Clearwater Range can also be accessed from Caroline, by travelling about 35 km west on Secondary Highway 591, and then utilizing Forestry Trunk Road 734.

Access to and throughout the property area is by truck, all-terrain vehicles, helicopter, and extensive hiking. Several logging roads and cut lines spurring off the main roads provide valuable ATV access throughout the property area.

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.

3.2 INFRASTRUCTURE

Accommodations, food, fuel and other necessary services are available in Caroline and Rocky Mountain House. The local economy is primarily based on agriculture, forestry, and energy-based industries.

Rocky Mountain House, with a population of about 6,500, is accessed by traveling about 67 km west of Red Deer along the David Thompson Highway (Highway 11), and then 12 km north along Highway 22.

The village of Caroline is about 49 km from Rocky Mountain House, 37 km south along Highway 22 and 12 km east along Highway 54. Caroline has a population of about 550.

3.3 TOPOGRAPHY, VEGETATION AND CLIMATE

The Clearwater Group permits are included in the Eastern-Slope Montane Forest Ecological Region, and lie within the Rocky-Clearwater District of the Alberta Forest Reserve. In the subalpine zone, vegetation consists of stunted subalpine fir and Englemann Spruce, and alpine foliage above the treeline. Vegetation in areas of rugged limestone outcroppings is generally sparse, and commonly consists of junipers, other low brush, and grasses. Below treeline, vegetation consists of dense stands of Aspen, Lodgepole Pine, White Spruce, and less frequent stands of Douglas Fir. Areas of lowest relief are covered with dense stands of Black Spruce and thick undergrowth, with local muskegs and swamps.

The properties are comprised of a series of northwest-trending ridges and valleys where elevations range from approximately 1,280 m along Clearwater River to about 2,200 m atop Limestone Mountain. They are cut by a number of creeks and rivers, including the Clearwater River, Cutoff, Rocky, Limestone, Moose, and Teepee Pole creeks.

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

3.4 FIELD OPERATIONS

Field operations were conducted by a four-person geological crew from Dahrouge Geological Consulting Ltd., based in a hotel in Rocky Mountain House.

Transportation to and from the property was by four-wheel-drive truck. Access throughout the property was by truck and ATV's where possible, and by extensive hiking.

Garmin GPSmap 60Cx instruments were used to mark outcrop locations and record access information. Compasses were set at a magnetic declination of 15°49' east.

4. PROPERTY, EXPLORATION AND EXPENDITURES

4.1 PROPERTY SUMMARY

In 1998, Graymont (nee: Continental Lime Ltd.) acquired MAIM Permit 9398100125 (Limestone Mountain) to cover Paleozoic limestones adjacent to the Corkscrew Mountain Permit (Fig.'s 3.2 and 4.1). The Limestone Mountain Permit covers the central and southern part of Limestone Range, and the southernmost portions of Clearwater Range. The permit has been reduced from an original area of 8,592 hectares to its current size of 2,336 hectares following exploration conducted prior to 2002.

MAIM Permit 9305090646 (Corkscrew West) is contiguous to the east part of the Limestone Mountain Permit; it was obtained on September 9, 2005 and currently encompasses 288 hectares (Fig.'s 3.2 and 4.1).

MAIM Permit 9310060379 (Idlewilde Mountain) was acquired by 877384 Alberta Ltd. in 2010 to cover additional limestone exposures in the Limestone Range, and is currently 4,736 hectares in size.

Based on the samples collected during the 2012 exploration, the entirety of MAIM Permits 9398100125 and 9310060379 will be retained. In addition, MAIM Permit 9398100125 has reached its permit term expiry and will need to be converted to lease (Section 4.3, Fig. 4.1).

4.2 2012 EXPLORATION SUMMARY

From June 20 to 28, 2012, Dahrouge Geological Consulting Ltd., on behalf of Graymont Western Canada Inc., conducted exploration for carbonate lithotypes within west-central Alberta. The work was undertaken to determine the location and extent of carbonate units in the permit area.

Carbonate outcrops were examined and a total of 86 samples were collected (Fig. 4.2). Geological observations were recorded, including lithologic information, measurements of structural elements, and other pertinent details (Appendix 2). A solution of 10% HCl was used to assess carbonate quality in the field, and rock samples were shipped to Central Lab of Graymont Western U.S. Inc. in Utah for analyses (Appendix 3). In some instances, interval thicknesses were determined by measuring outcrops perpendicular to bedding, where it could be identified. Field maps were completed on 1:20,000 and 1:30,000 scale map sheets and concentrated on areas surrounding and including Limestone Mountain and Marble Mountain, along Clearwater and Limestone ranges.

4.3 EXPLORATION EXPENDITURES

Expenditures for 2012 totaled $46,188.20. The entirety of the Limestone Mountain (MAIM Permit 9398100125), Corkscrew West (MAIM Permit 9305090646), and Idlewilde Mountain (MAIM Permit 9310060379) permits will be retained. The Limestone Mountain (MAIM Permit 9398100125) Permit will reach its term expiry date on October 30, 2012, and hence a decision on which portions will be converted to lease is pending.

Expenditures are allocated to MAIM Permits 9398100125, 9305090646 & 9310060379 as follows:

MAIM Permit	Permit Area (ha)	Required Expenditures	Assigned Expenditures	New Expiry Date
9398100125	2,336	$21,936.00[1]	$21,936.00	Oct. 30, 2012[3]
9305090646	288	$4320.00	$8640.00	Sept. 9, 2019
9310060379	4,736	$39,468.00[2]	$15,612.20	June 8, 2014

[1] Calculated from $35,040 - previous credit of $13,104

[2] Calculated from $47,360 - previous credit of $7,892

[3] Term expiry

5. REGIONAL GEOLOGY

5.1 STRATIGRAPHY

At Clearwater and Limestone ranges, carbonate lithologies are known to occur within both Paleozoic and Mesozoic sequences (Table 5.1, Fig. 4.2). Paleozoic limestones are described in the Upper Devonian Palliser Formation, Upper Devonian to Lower Carboniferous Banff Formation and the Lower Carboniferous Rundle Assemblage. The Paleozoic limestones encountered within the Limestone Mountain and Idlewilde Mountain permits were from the Turner Valley, Shunda and Pekisko formations of the Rundle Assemblage, the Banff Formation of the Banff Assemblage, and the Palliser Formation. Mesozoic rocks of the Fernie Group have been noted within the permit group area.

5.1.1 Palliser Formation

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

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

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

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

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

5.1.2 Banff Assemblage

In west-central Alberta, the Exshaw, Banff and Yohin formations comprise the Banff Assemblage (Richards et al. 1994). Only exposures of the Banff Formation appear within the Clearwater Group permits. 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.

5.1.3 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). 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.

5.1.4 Fernie Group

The Fernie Group includes all but the uppermost Jurassic strata of western Alberta and eastern British Columbia. Although treated as a Group, the Fernie is divided into a number of members and informal units with uncertain mutual relations and continuity. The Fernie Group thickens gently and irregularly west and southwest.

Outcrops of the Fernie Group, noted within the Clearwater Group permits, consist of large thicknesses of shale and calcareous sandstones with minor conglomerate.

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.

6. RESULTS

Eight days were spent checking property access and outlining carbonate outcrops in detail. The 2012 exploration concentrated on defining stratigraphic unit locations and contacts within previously under-explored areas of the property.

Carbonate lithologies of the Rundle Assemblage, Banff Formation and Palliser Formation were examined and sampled within Clearwater and Limestone ranges, near Limestone Mountain and Marble Mountain (Fig. 4.2). A total of 86 discrete intervals were examined and sampled,

representing more than 200 m of stratigraphy (Appendix 2). Where bedding could not be identified, stratigraphic measurements were taken based on the previously determined regional trend or deduced from surrounding measurements where possible.

A single section of Banff Formation was examined in 2012. Section 2012-09, located on the north-east flank of Limestone Mountain, averaged 53.49% $CaCO_3$, 42.62% $MgCO_3$ and 2.92% SiO_2 over 9.5 metres and consisted of tan-grey dolomitic mudstone (Fig. 4.2). The Banff Formation is not considered a unit of interest due to it's low $CaCO_3$ values and high SiO_2 content.

The majority of the outcrops visited in 2012 were within the Pekisko Formation. Analytical results were variable, presumably due to the fact that different members within the formation were sampled. The largest sample section was 2012-07, which averaged 93.93% $CaCO_3$, 4.80% $MgCO_3$ and 0.86% SiO_2 over approximately 41.5 m, and was collected on the top of Limestone Mountain (Fig. 4.2). Within the section, the high-grade Gap Member averaged 98.32% $CaCO_3$, 1.22% $MgCO_3$ and 0.20% SiO_2 over 11.5 m. Several other sample sections and isolated intervals returned values in excess of 95% $CaCO_3$ over several metres, however $MgCO_3$ impurities were common in many intervals. The high-quality Pekisko intervals generally consist of resistant and massive, light- to medium-brownish-grey, fine- to coarse-grained crinoidal lime packstone to grainstone. Lower quality intervals generally consist of less resistant, medium- to dark-brownish-grey, micritic to fine-grained lime mudstone to packstone. Overall, the Pekisko Formation has the greatest high-calcium limestone potential in the area.

Several outcrops of Turner Valley Formation were examined in 2012 to test for high-quality dolomite potential. All of the outcrops were strongly dolomitic, ranging from 40.94 to 44.22% $MgCO_3$ with less than 5% SiO_2 over 2-3 metres. They generally consisted of vuggy, medium-brown to medium-grey, moderately to strongly dolomitic mudstone with minor wackestone to packstone. The Turner Valley Formation has the greatest potential for high-quality dolomite in the permit area.

7. CONCLUSIONS

Carbonate units of the Palliser, Banff, Pekisko, and Turner Valley formations were examined and measured along Clearwater and Limestone ranges, near Limestone and Marble mountains and within MAIM Permits 9398100125 and 9310060379. A total of 86 discrete intervals were sampled and described in detail. Based on the samples collected during the 2012 exploration, the entirety of MAIM Permits 9398100125 and 9310060379 will be retained. In addition, MAIM Permit 9398100125 has reached its permit term expiry and will need to be converted to lease.

Access roads and trails were noted, which provide access to most parts of the property.

Future exploration will expand on previously conducted work in the area, confirming or redefining past geological interpretations and determining the potential for high-calcium limestone and/or high-quality dolomite within the permit area.

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9. STATEMENT OF QUALIFICATIONS

I, Patrick Kluczny, [redacted] 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 2006 graduate of the University of Alberta, Edmonton, Alberta with a B.Sc. in Geology.
- I have practiced my profession as a geologist continuously since 2006.
- I am a registered Professional Geologist with the Association of Professional Engineers and Geoscientists of Alberta, member M81985.
- I hereby consent to the copying or reproduction of this Assessment Report following the one-year confidentiality period.
- I am the author of the report entitled "2012 Exploration and Fieldwork within the Clearwater Group Metallic and Industrial Minerals Permits, West-Central Alberta" and accept responsibility for the veracity of technical data and results.

Dated this 30th day of October, 2012.

PROFESSIONAL GEOLOGIST ALBERTA PATRICK KLUCZNY

Patrick Kluczny, B.Sc., P.Geol.

APEGA M81985

APPENDIX 1: COST STATEMENT FOR THE 2012 EXPLORATION WITHIN THE CLEARWATER GROUP PERMITS

a) **Personnel**		$ 24,052.00
b) **Food and Accommodation**		$ 5,578.85
c) **Transportation**		$ 7,579.26
d) **Instrument Rental**		$ 153.42
e) **Drilling**	n/a	$ -
f) **Analyses**		$ 2,537.00
h) **Other** (Software Rental, Data, Field maps, Courier & Shipping)		$ 2,088.74
Total		$ 41,989.27
Administration (10%)		$ 4,198.93
Total + Administration		**$ 46,188.20**

C

APPENDIX 2: SAMPLE DESCRIPTIONS AND ASSAY RESULTS FROM CLEARWATER AND LIMESTONE RANGES

Notes: Stratigraphic thicknesses are based on measured attitudes of bedding listed below, with appropriate interpolations. Attitudes are strike and dip (right-hand rule). Sections are listed in numerical order of samples, which does not necessarily represent stratigraphic order. Most samples consist of chips at 30 cm intervals. UTM coordinates are NAD83, Zone 11N. Section locations are shown in Figure 4.2. Stratigraphy Abbreviations (Dpa - Devonian Palliser Formation; Mbf - Mississippian Banff Formation; Mpk - Mississippian Pekisko Formation; Msh - Mississippian Shunda Formation; Mtv - Mississippian Turner Valley Formation)

Sample	Strat Unit	Strat Tkns (m)	Description	$CaCO_3$ (%)	$MgCO_3$ (%)	SiO_2 (%)	Al_2O_3 (%)	Fe_2O_3 (%)	SrO (ppm)	MnO (ppm)	P_2O_5 (ppm)
Isolated Samples											
73959	Mpk		**Lime Mudstone to Lime Wackestone**, light grey weathered, dark brown-grey fresh, micritic to very fine-grained, fossils: fragment (indeterminate); crinoid ossicle, thickly-bedded, strong HCl reaction, structure(s): calcite vein very weak	91.26	5.75	1.58	0.313	0.484	271	116	50
73960	Mtv		**Lime Wackestone to Lime Packstone**, light grey to medium grey weathered, light brown to medium brown fresh, cryptocrystalline to medium-grained, fossils: peloid; fragment (indeterminate); crinoid ossicle, vuggy, strong HCl reaction, structure(s): calcite vein weak	94.77	3.64	0.94	0.097	0.123	264	54	50
73961	Mtv	3	**Lime Packstone**, light grey to medium grey weathered, light brown to medium brown fresh, cryptocrystalline to medium-grained, fossils: peloid; fragment (indeterminate); crinoid ossicle, vuggy; oolitic, strong HCl reaction, structure(s): calcite vein weak; bedding (definite) 118/12 SW	93.01	4.77	1.68	0.176	0.112	243	39	50
73962	Mtv	3.75	**Lime Wackestone**, light grey to medium grey weathered, light brown to medium brown fresh, cryptocrystalline to medium-grained, fossils: peloid; fragment (indeterminate); crinoid ossicle, vuggy; oolitic, strong HCl reaction, structure(s): calcite vein weak	93.99	4.12	1.25	0.150	0.151	233	54	50
73963	Mtv	3	**Lime Packstone**, light grey to medium grey weathered, light brown to medium brown fresh, cryptocrystalline to medium-grained, fossils: peloid; fragment (indeterminate); crinoid ossicle, vuggy; oolitic, strong HCl reaction, structure(s): calcite vein weak	94.92	2.59	1.49	0.137	0.128	233	42	50
73964	Mtv	3	**Lime Packstone**, light grey to medium grey weathered, light brown to medium brown fresh, cryptocrystalline to medium-grained, fossils: peloid; fragment (indeterminate); crinoid ossicle, vuggy; oolitic, strong HCl reaction, structure(s): joint 34/72 SE; calcite vein weak	94.84	2.82	1.29	0.170	0.150	270	47	50
73965	Mtv	3	**Lime Mudstone to Lime Wackestone**, light grey weathered, light brown-grey to medium brown-grey fresh, micritic to fine-grained, fossils: peloid; fragment (indeterminate); crinoid ossicle, vuggy, strong HCl reaction, structure(s): calcite vein weak	93.33	4.98	1.32	0.151	0.102	303	39	50
73966	Mtv	3	**Lime Mudstone to Lime Wackestone**, light grey weathered, light brown-grey to medium brown-grey fresh, micritic to fine-grained, fossils: peloid; fragment (indeterminate); crinoid ossicle, vuggy, strong HCl reaction, structure(s): calcite vein weak; bedding (definite) 141/22 SW	83.26	14.48	1.51	0.226	0.171	244	54	50
73976	Mtv	2.5	**Dolomitic Packstone to Dolomitic Packstone**, medium grey weathered, light tan-grey fresh, very fine-grained to medium-grained, fossils: fragment (indeterminate), common; crinoid stem; crinoid ossicle, abundant; brachiopod, vuggy, resistant	55.47	43.95	0.43	0.034	0.049	83	68	50
73977	Mtv		**Dolomitic Mudstone to Dolomitic Lime Packstone**, light grey to tan weathered, tan to medium grey fresh, very fine-grained to medium-grained, fossils: crinoid ossicle, rare, vuggy; massive, slightly resistant	24.38	18.56	45.95	0.039	0.075	44	38	50
73978	Mtv		**Lime Mudstone**, light tan-grey weathered, tan-grey fresh, very fine-grained to medium-grained, fossils: crinoid ossicle, common, resistant	82.05	16.36	0.94	0.074	0.065	189	35	50
73993	Mpk	2.5	**Lime Wackestone to Lime Packstone**, medium brown-grey weathered, medium brown-grey fresh, fine-grained to medium-grained, fossils: fragment (indeterminate); crinoid ossicle, vuggy, resistant, very strong HCl reaction, structure(s): calcite veinlet weak	98.36	0.82	0.48	0.050	0.049	228	57	50

Sample	Strat Unit	Strat Tkns (m)	Description	$CaCO_3$ (%)	$MgCO_3$ (%)	SiO_2 (%)	Al_2O_3 (%)	Fe_2O_3 (%)	SrO (ppm)	MnO (ppm)	P_2O_5 (ppm)
73994	Mpkc	1	**Lime Mudstone**, medium grey weathered, dark brown-grey fresh, very fine-grained, alteration: oxide, 20-40% intensity, slightly resistant, strong HCl reaction, structure(s): calcite vein weak	97.15	1.46	0.89	0.086	0.078	409	28	50
73995	Mpkc	1	**Lime Mudstone**, medium grey weathered, dark brown-grey fresh, very fine-grained, alteration: oxide, 20-40% intensity, vuggy, slightly resistant, strong HCl reaction, structure(s): calcite veinlet weak; calcite vein weak	97.61	1.17	0.63	0.071	0.050	400	22	50
73996	Mpkg	2	**Lime Packstone to Lime Grainstone**, medium brown-grey to dark brown-grey weathered, medium brown-grey fresh, fine-grained to medium-grained, fossils: fragment (indeterminate), abundant; crinoid ossicle, abundant; bryozoan, moderately-bedded, resistant, very strong HCl reaction, structure(s): bedding (definite) 343/51 E	98.59	0.88	0.19	0.040	0.045	288	25	50
74030	Mpk	1.5	**Calcareous Dolomitic Mudstone to Calcareous Dolomitic Packstone**, light tan-grey weathered, tan-grey fresh, very fine-grained to medium-grained, alteration: oxide, fracture-related, 20-40% intensity, thickly-bedded; nodular; moderately-bedded	54.67	43.83	1.20	0.112	0.088	103	66	50
74031	Mpk	2	**Calcareous Dolomitic Packstone to Calcareous Dolomitic Wackestone**, light tan-grey to medium grey weathered, light tan-grey fresh, fine-grained to medium-grained, vuggy; thickly-bedded; moderately-bedded, weak HCl reaction, structure(s): calcite veinlet weak	55.38	43.28	1.07	0.072	0.099	113	144	50
74032	Msh	2	**Dolomitic Mudstone to Dolomitic Wackestone**, very-light grey weathered, medium brown-grey to light grey fresh, cryptocrystalline to medium-grained, vuggy, very weak HCl reaction, structure(s): fracture strong; calcite veinlet weak; bedding (undulatory) 49/10 SE;	53.74	43.20	2.29	0.372	0.141	89	196	116
74035	Mpkc	1	**Lime Mudstone**, medium grey weathered, medium brown-grey fresh, micritic to very fine-grained, alteration: oxide, fracture-related, slightly resistant, strong HCl reaction, structure(s): calcite vein weak	89.20	9.02	0.99	0.099	0.067	239	39	50
74036	Mpkc	1.5	**Lime Mudstone to Lime Wackestone**, medium grey weathered, light grey to medium grey fresh, micritic to very fine-grained, fossils: fragment (indeterminate), rare; crinoid ossicle, rare, strong HCl reaction, structure(s): calcite vein weak	80.33	17.22	2.05	0.191	0.156	200	44	50
74037	Mpk	1.5	**Lime Mudstone to Lime Grainstone**, medium grey weathered, light brown-grey to medium grey fresh, micritic to medium-grained, fossils: fragment (indeterminate); crinoid ossicle, vuggy, strong HCl reaction, structure(s): calcite veinlet weak	84.81	13.12	1.54	0.201	0.131	192	62	50
74038	Msh	1	**Dolomitic Mudstone**, tan-grey weathered, medium brown fresh, cryptocrystalline to very fine-grained, massive, soft, recessive, no HCl reaction, structure(s): calcite veinlet weak	58.74	40.23	0.70	0.063	0.121	586	131	50
74039	Mpk	1	**Lime Mudstone to Lime Wackestone**, light grey weathered, medium grey fresh, micritic to fine-grained, fossils: fragment (indeterminate), alteration: oxide, fracture-related, 20-40% intensity, moderately-bedded, resistant, strong HCl reaction, structure(s): calcite vein weak; bedding (approximate) 172/20 W	87.62	9.90	1.71	0.240	0.106	304	37	50
74040	Mpk	1	**Lime Mudstone to Lime Wackestone**, light grey weathered, medium grey fresh, micritic to fine-grained, fossils: fragment (indeterminate), alteration: oxide, fracture-related, 20-40% intensity, moderately-bedded, resistant, strong HCl reaction, structure(s): calcite vein weak	92.42	6.72	0.45	0.066	0.070	252	24	50
74041	Mpk	0.5	**Lime Wackestone**, light grey weathered, light grey to medium grey fresh, very fine-grained to fine-grained, nodular, resistant	88.95	10.33	0.51	0.077	0.050	251	25	50
74042	Mpk	1.5	**Lime Mudstone**, light grey weathered, medium grey fresh, very fine-grained, alteration: oxide, fracture-related, 20-40% intensity, vuggy; brecciated, resistant, very strong HCl reaction, structure(s): fracture, local-scale, strong	91.01	8.01	0.60	0.089	0.118	290	24	50
74043	Mpk	1.5	**Lime Mudstone**, light grey weathered, medium grey fresh, very fine-grained, alteration: oxide, fracture-related, 20-40% intensity, vuggy; brecciated, resistant, strong HCl reaction, structure(s): fracture, local-scale, strong	91.06	7.87	0.52	0.082	0.081	312	22	50

Sample	Strat Unit	Strat Tkns (m)	Description	$CaCO_3$ (%)	$MgCO_3$ (%)	SiO_2 (%)	Al_2O_3 (%)	Fe_2O_3 (%)	SrO (ppm)	MnO (ppm)	P_2O_5 (ppm)
74044	Mpk	2.5	**Lime Mudstone**, light grey weathered, medium grey fresh, very fine-grained, alteration: oxide, fracture-related, 20-40% intensity, vuggy; brecciated, resistant, strong HCl reaction, structure(s): fracture, local-scale, strong; bedding (approximate) 41/14 SE	91.22	7.87	0.38	0.061	0.033	313	21	50
2012-10 (UTM 604657E, 5758574N)											
74004	Mpkg	2	**Lime Grainstone**, light grey weathered, medium grey fresh, very fine-grained to fine-grained, fossils: peloid; fragment (indeterminate); crinoid ossicle, massive, resistant, very strong HCl reaction, structure(s): calcite vein very weak; bedding (approximate) W	98.00	1.34	0.16	0.017	0.074	350	23	50
74005	Mpkg	2.75	**Lime Packstone to Lime Grainstone**, light grey weathered, medium grey fresh, very fine-grained to fine-grained, fossils: peloid; fragment (indeterminate); crinoid ossicle, massive, resistant, very strong HCl reaction, structure(s): calcite vein very weak	90.58	3.70	5.50	0.040	0.044	331	19	50
74006	Mpkc	3	**Lime Mudstone to Lime Wackestone**, light brown-grey weathered, dark brown-grey fresh, micritic to fine-grained, fossils: fragment (indeterminate); crinoid ossicle, moderately-bedded, slightly resistant, strong HCl reaction, structure(s): calcite veinlet very weak; bedding (definite) 178/16 W	82.35	16.00	1.07	0.100	0.066	301	31	174
74007	Ml	3.5	**Lime Mudstone to Lime Wackestone**, light brown-grey weathered, dark brown-grey fresh, micritic to fine-grained, fossils: fragment (indeterminate); crinoid ossicle, moderately-bedded, slightly resistant, strong HCl reaction, structure(s): calcite veinlet very weak	79.41	7.59	12.46	0.077	0.063	317	25	218
74008	Mpkc	3	**Lime Mudstone to Lime Wackestone**, light brown-grey weathered, dark brown-grey fresh, micritic to fine-grained, fossils: fragment (indeterminate); crinoid ossicle, moderately-bedded, slightly resistant, no HCl reaction, structure(s): calcite veinlet very weak	92.10	6.69	0.44	0.057	0.105	524	19	50
74009	Mpkc	2.75	**Lime Wackestone**, light brown-grey weathered, dark brown-grey fresh, micritic to fine-grained, fossils: fragment (indeterminate); crinoid ossicle, moderately-bedded, slightly resistant, strong HCl reaction, structure(s): calcite veinlet very weak; bedding (definite) 191/19 W	91.56	5.98	1.68	0.214	0.119	595	29	50
74010	Mpkc	2.75	**Lime Mudstone to Lime Wackestone**, light brown-grey weathered, dark brown-grey fresh, micritic to fine-grained, fossils: fragment (indeterminate); crinoid ossicle, moderately-bedded, slightly resistant, strong HCl reaction, structure(s): calcite veinlet very weak	85.99	9.77	3.21	0.377	0.172	605	44	50
74011	Mpkc	2.75	**Lime Mudstone to Lime Wackestone**, light grey weathered, medium grey fresh, micritic to fine-grained, fossils: fragment (indeterminate); crinoid ossicle, moderately-bedded, slightly resistant, strong HCl reaction, structure(s): calcite veinlet very weak	86.79	11.84	0.90	0.117	0.071	417	34	50
74012	Mpkc	2.75	**Lime Wackestone**, light brown-grey weathered, dark brown-grey fresh, micritic to fine-grained, fossils: fragment (indeterminate); crinoid ossicle, moderately-bedded, slightly resistant, strong HCl reaction, structure(s): calcite veinlet very weak; bedding (definite) 193/15 W	84.17	13.91	1.23	0.176	0.098	456	37	50
74013	Mpkc	4	**Lime Mudstone to Lime Wackestone**, light brown-grey weathered, dark brown-grey fresh, micritic to fine-grained, fossils: fragment (indeterminate); crinoid ossicle, vuggy; moderately-bedded, slightly resistant, strong HCl reaction, structure(s): calcite veinlet very weak	87.01	11.78	0.74	0.091	0.103	318	39	50
2012-11 (UTM 604637E, 5758683N)											
74014	Ml	4.75	**Lime Mudstone to Lime Wackestone**, light grey weathered, medium grey fresh, micritic to fine-grained, fossils: fragment (indeterminate); crinoid ossicle, moderately-bedded, resistant, strong HCl reaction, structure(s): calcite veinlet weak	93.33	5.19	0.89	0.123	0.085	548	28	50
74015	Mpkc	4.25	**Lime Mudstone to Lime Wackestone**, light grey weathered, medium grey to dark grey fresh, micritic to fine-grained, fossils: fragment (indeterminate); crinoid ossicle, moderately-bedded, resistant, strong HCl reaction, structure(s): calcite veinlet weak	81.98	14.04	2.84	0.421	0.161	520	51	50

Sample	Strat Unit	Strat Tkns (m)	Description	$CaCO_3$ (%)	$MgCO_3$ (%)	SiO_2 (%)	Al_2O_3 (%)	Fe_2O_3 (%)	SrO (ppm)	MnO (ppm)	P_2O_5 (ppm)
74016	Mpkc	3.25	**Lime Mudstone to Lime Wackestone**, light grey weathered, medium grey fresh, micritic to fine-grained, fossils: fragment (indeterminate); crinoid ossicle, moderately-bedded, resistant, strong HCl reaction, structure(s): calcite veinlet weak	86.28	11.61	1.53	0.187	0.140	382	40	50
74017	Mpkc	3.25	**Lime Mudstone to Lime Wackestone**, light grey weathered, medium grey fresh, micritic to fine-grained, fossils: fragment (indeterminate); crinoid ossicle, moderately-bedded, resistant, strong HCl reaction, structure(s): calcite veinlet weak	73.55	25.04	0.97	0.129	0.140	292	58	50
74018	Mpkc	2	**Lime Mudstone to Lime Wackestone**, light grey weathered, medium grey fresh, micritic to fine-grained, fossils: fragment (indeterminate); crinoid ossicle, vuggy; moderately-bedded, resistant, strong HCl reaction, structure(s): calcite veinlet weak; bedding (definite) 191/17 W	84.74	13.89	0.75	0.111	0.206	288	57	50
2012-12 (UTM 609607E, 5754251N)											
74019	Mtv	3	**Calcareous Dolomitic Mudstone**, very-light grey weathered, light tan-grey fresh, cryptocrystalline to very fine-grained, moderately-bedded, resistant, very weak HCl reaction, structure(s): calcite veinlet weak	52.51	42.72	3.54	0.607	0.229	81	244	50
74020	Mtv	2.5	**Calcareous Dolomitic Mudstone**, very-light grey weathered, light grey to medium grey fresh, cryptocrystalline to very coarse-grained, moderately-bedded, resistant, very weak HCl reaction, structure(s): calcite veinlet weak; bedding (definite) 320/23 E	52.42	43.39	3.11	0.483	0.208	75	366	50
74021	Mtv	3	**Dolomitic Mudstone**, very-light grey weathered, very-light grey to medium grey fresh, cryptocrystalline to very fine-grained, fossils: solitary rugose coral, rare, vuggy, no HCl reaction, structure(s): bedding (definite) 343/27 E	53.56	44.22	1.61	0.199	0.175	83	470	50
2012-13 (UTM 609472E, 5754204N)											
74022	Mpkc	2.25	**Calcareous Dolomitic Mudstone to Calcareous Dolomitic Wackestone**, very-light grey to light tan-grey weathered, light grey to medium grey fresh, cryptocrystalline to medium-grained, hard, resistant, weak HCl reaction, structure(s): calcite veinlet weak; calcite vein, local-scale, strong	52.94	41.51	4.32	0.549	0.209	125	541	50
74023	Mtv	6	**Dolomitic Mudstone**, very-light grey to light grey weathered, light grey to medium grey fresh, cryptocrystalline to very fine-grained, alteration: oxide, 20-40% intensity, nodular, resistant, very weak HCl reaction, structure(s): calcite veinlet weak	52.58	40.94	5.14	0.674	0.193	104	355	50
74024	Mtv	0.25	**Dolomitic Mudstone**, very-light grey to light grey weathered, light grey to medium grey fresh, cryptocrystalline to very fine-grained, alteration: oxide, 20-40% intensity, nodular, resistant, very weak HCl reaction, structure(s): calcite veinlet weak; bedding (undulatory) 20/37 NE	53.74	43.49	1.91	0.397	0.155	98	232	127
2012-14 (UTM 609334E, 5754117N)											
74025	Mpkc	0.75	**Calcareous Dolomitic Mudstone to Calcareous Dolomitic Wackestone**, very-light grey to medium grey weathered, tan-grey fresh, cryptocrystalline to medium-grained, nodular, resistant, very weak HCl reaction, structure(s): calcite vein moderate	56.29	40.98	2.08	0.250	0.171	107	138	228
74026	Mpk	0.25	**Calcareous Dolomitic Mudstone**, very-light grey to medium grey weathered, tan-grey fresh, cryptocrystalline to medium-grained, alteration: oxide, fracture-related, 20-40% intensity, nodular, resistant, very weak HCl reaction, structure(s): calcite vein moderate	49.40	40.94	7.53	1.010	0.337	90	127	234
74027	Mpk	2.25	**Calcareous Dolomitic Mudstone**, very-light grey to medium grey weathered, tan-grey fresh, cryptocrystalline to medium-grained, alteration: oxide, fracture-related, 20-40% intensity, nodular, resistant, very weak HCl reaction, structure(s): calcite vein moderate	49.19	41.25	6.81	1.379	0.475	90	123	191
74028	Mpk	3.5	**Calcareous Dolomitic Mudstone**, very-light grey to medium grey weathered, tan-grey fresh, cryptocrystalline to medium-grained, alteration: oxide, fracture-related, 20-40% intensity, nodular, resistant, very weak HCl reaction, structure(s): calcite vein moderate	49.64	41.67	6.36	1.211	0.321	88	123	283

Sample	Strat Unit	Strat Tkns (m)	Description	$CaCO_3$ (%)	$MgCO_3$ (%)	SiO_2 (%)	Al_2O_3 (%)	Fe_2O_3 (%)	SrO (ppm)	MnO (ppm)	P_2O_5 (ppm)
74029	Mpk	1.25	**Calcareous Dolomitic Mudstone**, very-light grey to medium grey weathered, tan-grey fresh, cryptocrystalline to medium-grained, alteration: oxide, fracture-related, 0-20% intensity, nodular, resistant, weak HCl reaction, structure(s): calcite vein weak; bedding (undulatory) 8/30 E	49.76	41.63	6.48	1.060	0.282	91	106	201
2012-15 (UTM 623312E, 5752054N)											
74033	Mpkc	0.75	**Lime Mudstone to Lime Wackestone**, medium grey weathered, tan-grey fresh, micritic to fine-grained, fossils: fragment (indeterminate); crinoid ossicle, very strong HCl reaction, structure(s): calcite vein moderate	79.00	19.85	0.83	0.132	0.153	189	43	50
74034	Mpkc	2.75	**Lime Mudstone to Lime Wackestone**, medium grey weathered, tan-grey fresh, micritic to fine-grained, fossils: fragment (indeterminate); crinoid ossicle, strong HCl reaction, structure(s): calcite vein moderate	83.58	15.42	0.45	0.077	0.063	219	31	50
2012-6 (UTM 624078E, 5750417N)											
73967	Mpkg	2.5	**Lime Packstone to Lime Grainstone**, light grey to medium grey weathered, medium grey fresh, micritic to medium-grained, fossils: fragment (indeterminate); crinoid ossicle, massive, resistant, very strong HCl reaction, structure(s): calcite veinlet very weak	98.29	1.00	0.23	0.048	0.087	281	33	50
73968	Mpkg	3	**Lime Packstone to Lime Grainstone**, light grey to medium grey weathered, medium grey fresh, micritic to medium-grained, fossils: fragment (indeterminate); crinoid ossicle, massive, resistant, strong HCl reaction, structure(s): calcite veinlet very weak	98.63	0.84	0.24	0.056	0.062	232	29	50
73969	Mpkg	2.75	**Lime Packstone to Lime Grainstone**, light grey to medium grey weathered, medium grey fresh, micritic to medium-grained, fossils: fragment (indeterminate); crinoid ossicle, massive, resistant, strong HCl reaction, structure(s): calcite veinlet very weak	98.97	0.77	0.13	0.032	0.087	225	30	50
73970	Mpkg	2.5	**Lime Packstone to Lime Grainstone**, light grey to medium grey weathered, medium grey fresh, micritic to medium-grained, fossils: fragment (indeterminate); crinoid ossicle, massive, resistant, strong HCl reaction, structure(s): calcite veinlet very weak	98.74	0.92	0.18	0.036	0.101	214	34	50
73971	Mpkg	1.25	**Lime Packstone to Lime Grainstone**, light grey to medium grey weathered, medium grey fresh, micritic to medium-grained, fossils: fragment (indeterminate); crinoid ossicle, massive, resistant, strong HCl reaction, structure(s): calcite veinlet very weak; bedding (undulatory) 134/32 SW	97.74	1.34	0.53	0.061	0.080	232	28	50
73972	Mpkg	3.5	**Lime Packstone to Lime Grainstone**, light grey to medium grey weathered, medium grey fresh, micritic to medium-grained, fossils: fragment (indeterminate); crinoid ossicle, massive, resistant, very strong HCl reaction, structure(s): calcite veinlet very weak	97.61	1.44	0.52	0.071	0.054	295	26	50
2012-7 (UTM 607654E, 5755005N)											
73973	Mpkg	1.25	**Lime Packstone to Lime Wackestone**, light grey weathered, tan-grey fresh, very fine-grained to medium-grained, fossils: fragment (indeterminate); crinoid ossicle, thickly-bedded; moderately-bedded, resistant, very strong HCl reaction, structure(s): bedding (undulatory) 180/21 W	98.25	1.13	0.21	0.053	0.049	320	27	50
73974	Mpkg	1.5	**Lime Wackestone**, light grey weathered, tan-grey fresh, very fine-grained to medium-grained, moderately-bedded, resistant	98.70	1.11	0.20	0.035	0.042	284	26	50
73975	Mpkg	3.75	**Lime Grainstone**, light grey weathered, light tan-grey fresh, fine-grained to medium-grained, fossils: fragment (indeterminate), abundant; crinoid ossicle, abundant, moderately-bedded, resistant	98.68	0.90	0.19	0.041	0.054	246	29	50
73982	Mpkg	5	**Lime Packstone to Lime Grainstone**, light tan-grey weathered, light tan-grey fresh, fine-grained to medium-grained, fossils: fragment (indeterminate); crinoid ossicle, common, massive, resistant	97.68	1.74	0.21	0.053	0.039	262	24	50
73983	Mpkc	2.75	**Lime Wackestone to Lime Packstone**, light tan-grey weathered, light tan-grey to tan-grey fresh, very fine-grained to medium-grained, fossils: crinoid ossicle, rare, vuggy; thickly-bedded; moderately-bedded, resistant	91.35	7.11	0.84	0.126	0.080	261	52	504

Sample	Strat Unit	Strat Tkns (m)	Description	$CaCO_3$ (%)	$MgCO_3$ (%)	SiO_2 (%)	Al_2O_3 (%)	Fe_2O_3 (%)	SrO (ppm)	MnO (ppm)	P_2O_5 (ppm)
73984	Mpkc	3	**Lime Wackestone to Lime Packstone**, light grey weathered, tan-grey fresh, very fine-grained to medium-grained, thickly-bedded; nodular; moderately-bedded, resistant, strong HCl reaction, structure(s): calcite veinlet weak	95.15	3.95	0.71	0.047	0.047	426	18	50
73985	Mpkc	3	**Lime Wackestone to Lime Packstone**, light grey weathered, tan-grey fresh, very fine-grained to medium-grained, thickly-bedded; nodular; moderately-bedded, resistant, very strong HCl reaction, structure(s): calcite veinlet moderate	98.02	1.53	0.34	0.035	0.040	384	20	50
73986	Mpkc	4.25	**Lime Wackestone to Lime Packstone**, light grey weathered, tan-grey fresh, very fine-grained to medium-grained, thickly-bedded; nodular; mottled, resistant, strong HCl reaction, structure(s): calcite veinlet moderate	98.25	1.30	0.32	0.047	0.037	403	20	50
73987	Mpkc	3.25	**Lime Mudstone to Lime Wackestone**, light grey weathered, light tan-grey to tan-grey fresh, very fine-grained to fine-grained, fossils: crinoid ossicle, rare, alteration: oxide, 20-40% intensity, resistant, very strong HCl reaction, structure(s): calcite vein weak	75.51	23.66	0.55	0.111	0.072	208	40	50
73988	Mpkc	2.25	**Lime Mudstone to Lime Packstone**, light grey weathered, dark grey fresh, very fine-grained to fine-grained, fossils: crinoid ossicle, alteration: oxide, 20-40% intensity, resistant, very strong HCl reaction, structure(s): calcite vein moderate	83.81	13.95	1.52	0.231	0.102	266	39	50
73989	Mpkc	2.25	**Lime Mudstone to Lime Wackestone**, light grey weathered, light tan-grey to tan-grey fresh, very fine-grained to fine-grained, fossils: crinoid ossicle, resistant, strong HCl reaction, structure(s): calcite vein weak	95.86	1.61	2.01	0.268	0.091	310	27	50
73990	Mpkc	2.25	**Lime Mudstone to Lime Wackestone**, light grey weathered, medium brown-grey to dark brown-grey fresh, very fine-grained to fine-grained, fossils: crinoid ossicle, alteration: oxide, 20-40% intensity, slightly resistant, very strong HCl reaction, structure(s): calcite vein weak	96.50	1.34	1.35	0.247	0.094	319	27	50
73991	Mpkq	4	**Lime Mudstone to Lime Wackestone**, light grey to dark grey weathered, dark brown-grey fresh, very fine-grained to fine-grained, alteration: oxide, fracture-related, thickly-bedded; moderately-bedded, resistant, very strong HCl reaction, structure(s): calcite vein strong; bedding (undulatory) 130/8 SW	94.33	1.59	2.99	0.571	0.206	352	68	50
73992	Mpkq	3.5	**Lime Mudstone to Lime Wackestone**, light grey weathered, light grey to medium grey fresh, very fine-grained to medium-grained, fossils: fragment (indeterminate); crinoid ossicle, massive, resistant, strong HCl reaction, structure(s): calcite vein weak; calcite vein moderate	92.97	6.30	0.67	0.068	0.054	347	53	50
2012-8 (UTM 623876E, 5751462N)											
73979	Mpk	3	**Lime Packstone to Lime Wackestone**, light tan-grey weathered, light tan-grey fresh, fine-grained to medium-grained, fossils: crinoid ossicle, rare, alteration: oxide, 20-40% intensity, massive, resistant	98.70	1.09	0.18	0.042	0.048	292	25	50
73980	Mpk	1.75	**Lime Mudstone to Lime Grainstone**, tan-grey weathered, light tan-grey fresh, very fine-grained to medium-grained, fossils: crinoid ossicle, common, alteration: oxide, 20-40% intensity, massive, resistant	95.74	2.49	1.06	0.114	0.074	271	35	50
73981	Mpk	1	**Lime Packstone to Lime Grainstone**, light tan-grey weathered, light tan-grey fresh, fine-grained to medium-grained, fossils: fragment (indeterminate); crinoid ossicle, common, massive, resistant	98.00	0.98	0.40	0.106	0.088	278	31	50
2012-9 (UTM 609436E, 5753744N)											
73997	Mbf	1.75	**Calcareous Dolomitic Mudstone**, light grey to tan weathered, light brown-grey fresh, cryptocrystalline to very fine-grained, fossils: fragment (indeterminate), very rare, vuggy; massive, weak HCl reaction, structure(s): bedding (definite) 348/22 E	56.79	42.03	0.54	0.093	0.075	126	122	50
73998	Mbf	4	**Dolomitic Mudstone**, light grey to tan weathered, light brown-grey fresh, cryptocrystalline to very fine-grained, fossils: fragment (indeterminate), very rare, well-bedded; vuggy; moderately-bedded	50.96	41.65	5.89	0.616	0.257	96	412	194

Sample	Strat Unit	Strat Tkns (m)	Description	$CaCO_3$ (%)	$MgCO_3$ (%)	SiO_2 (%)	Al_2O_3 (%)	Fe_2O_3 (%)	SrO (ppm)	MnO (ppm)	P_2O_5 (ppm)
73999	Mbf	1.75	**Dolomitic Mudstone**, light grey to tan weathered, light brown-grey fresh, cryptocrystalline to very fine-grained, fossils: fragment (indeterminate), very rare, well-bedded; vuggy; moderately-bedded, very weak HCl reaction, structure(s): bedding (definite) 344/18 NE	53.70	44.12	1.64	0.227	0.123	68	149	50
74000	Mbf	2	**Dolomitic Mudstone**, light grey to tan weathered, light brown-grey fresh, cryptocrystalline to very fine-grained, fossils: fragment (indeterminate), very rare, vuggy; moderately-bedded	52.51	42.68	3.61	0.611	0.193	78	289	50
74001	Mtv	2	**Dolomitic Mudstone**, light grey to medium grey weathered, light brown-grey fresh, cryptocrystalline to very fine-grained, vuggy; moderately-bedded, resistant, very weak HCl reaction, structure(s): calcite vein weak	52.10	43.10	3.49	0.595	0.238	82	556	50
74002	Mtv	1.75	**Dolomitic Mudstone**, light grey to medium grey weathered, light brown-grey fresh, cryptocrystalline to very fine-grained, vuggy; moderately-bedded, resistant, very weak HCl reaction, structure(s): calcite vein weak	53.42	42.01	3.46	0.514	0.160	92	787	123
74003	Mtv	2	**Dolomitic Mudstone**, light grey to medium grey weathered, light brown-grey to medium brown-grey fresh, cryptocrystalline to very fine-grained, vuggy; moderately-bedded, resistant, very weak HCl reaction, structure(s): calcite vein weak	49.22	30.48	18.18	0.441	0.176	98	524	793

APPENDIX 3: ANALYTICAL LABORATORY INFORMATION AND TECHNIQUES

Name and Address of the Lab:

Graymont Western US Inc., Central Laboratory.
670 East 3900 South, Suite 200
Salt Lake City, Utah, 84107

Statement of Qualifications:

Jared Leikam obtained a B.S. in Chemistry from the University of Utah in the class of 2003. Jared started working for Graymont in February of 2004 and has been working with the ICP Spectrometer for two and a half years, under the direct supervision of Carl Paystrup (Lab Supervisor).

Vonda Stuart obtained a B.S. in Chemistry from Weber State University in 2004. Vonda started with Graymont in August of 2007 and started working in the ICP Lab the following September.

Sample Preparation, Procedures, Reagents, Equipment, etc.:

For the ICP sample preparation, 0.5 grams of the sample is mixed with 3 g of lithium carbonate. The sample and the lithium carbonate are then fused together in a muffle furnace at 850°C. Following the fusion process, the samples are dissolved in 1:1 HCl; a total of 40 mL 1:1 HCl is used in the dissolving process. The samples are then diluted to 200 mL and spiked with 10 ppm Co. Cobalt is used as an internal standard. At this point the samples are ready for analysis on the Perkin Elmer, Optima 7300V.

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 200 g). The stone is then dried in an oven at 120ºC. 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^{th} 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 (10 ppm Co) to further ensure the quality and accuracy of the analysis.

Location of MAIM Permits 9398100125, 9305090646 & 9310060379

LEGEND

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

Scale

75 0 75 150 225 km

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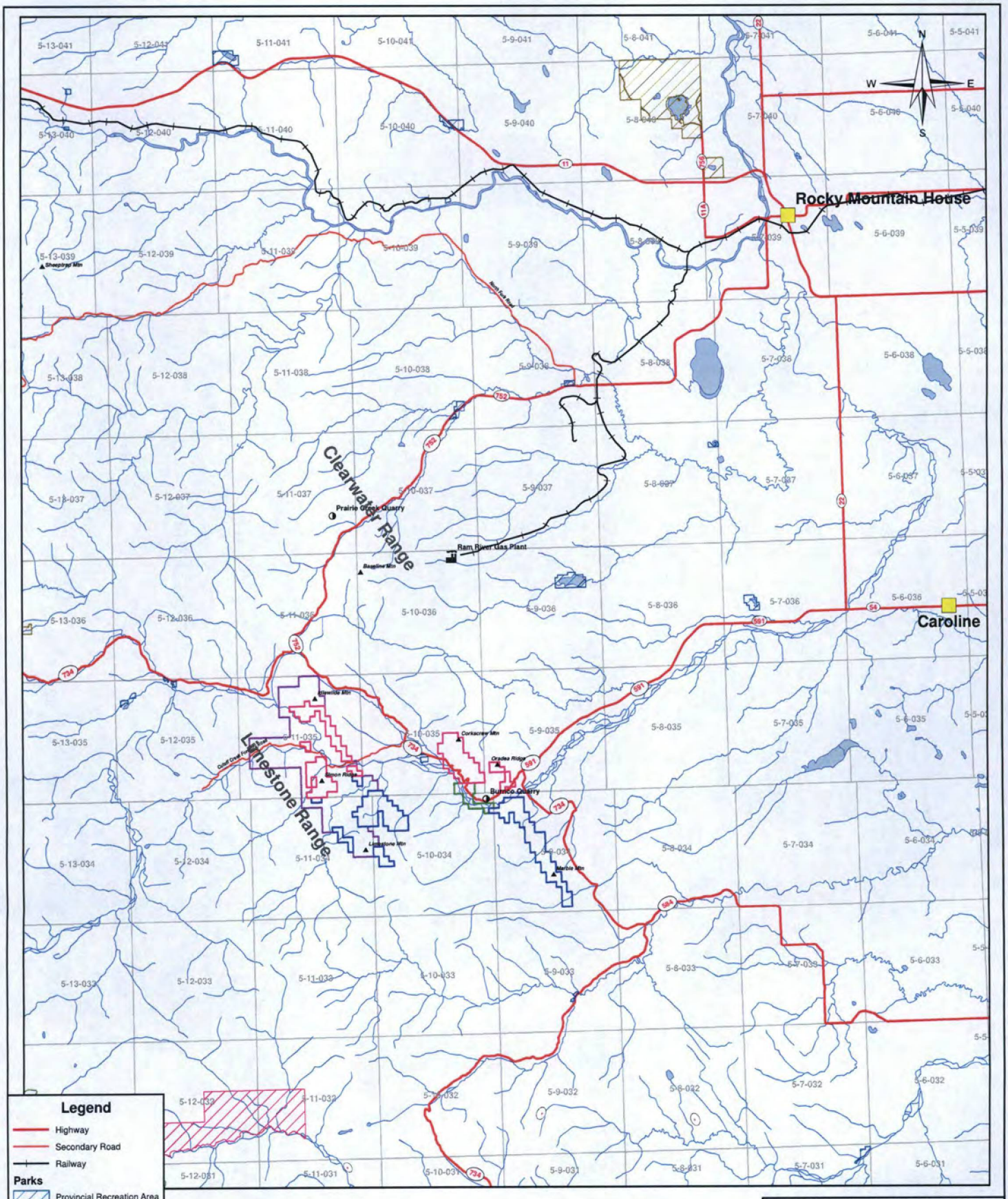
Edmonton, Alberta

CLEARWATER-LIMESTONE RANGES,
WEST-CENTRAL ALBERTA

Fig. 3.1
Property Location

PK 2012.10



Legend

- Highway
- Secondary Road
- Railway

Parks

- Provincial Recreation Area
- Provincial Park
- National Park
- First Nations Reserve

MAIM Permits

- Limestone Mountain
- Idlewilde Mountain
- Corkscrew West
- Corkscrew Leases

Kilometres

0 5 10 15

1:400,000

Coordinate System: UTM NAD83, Zone 11N

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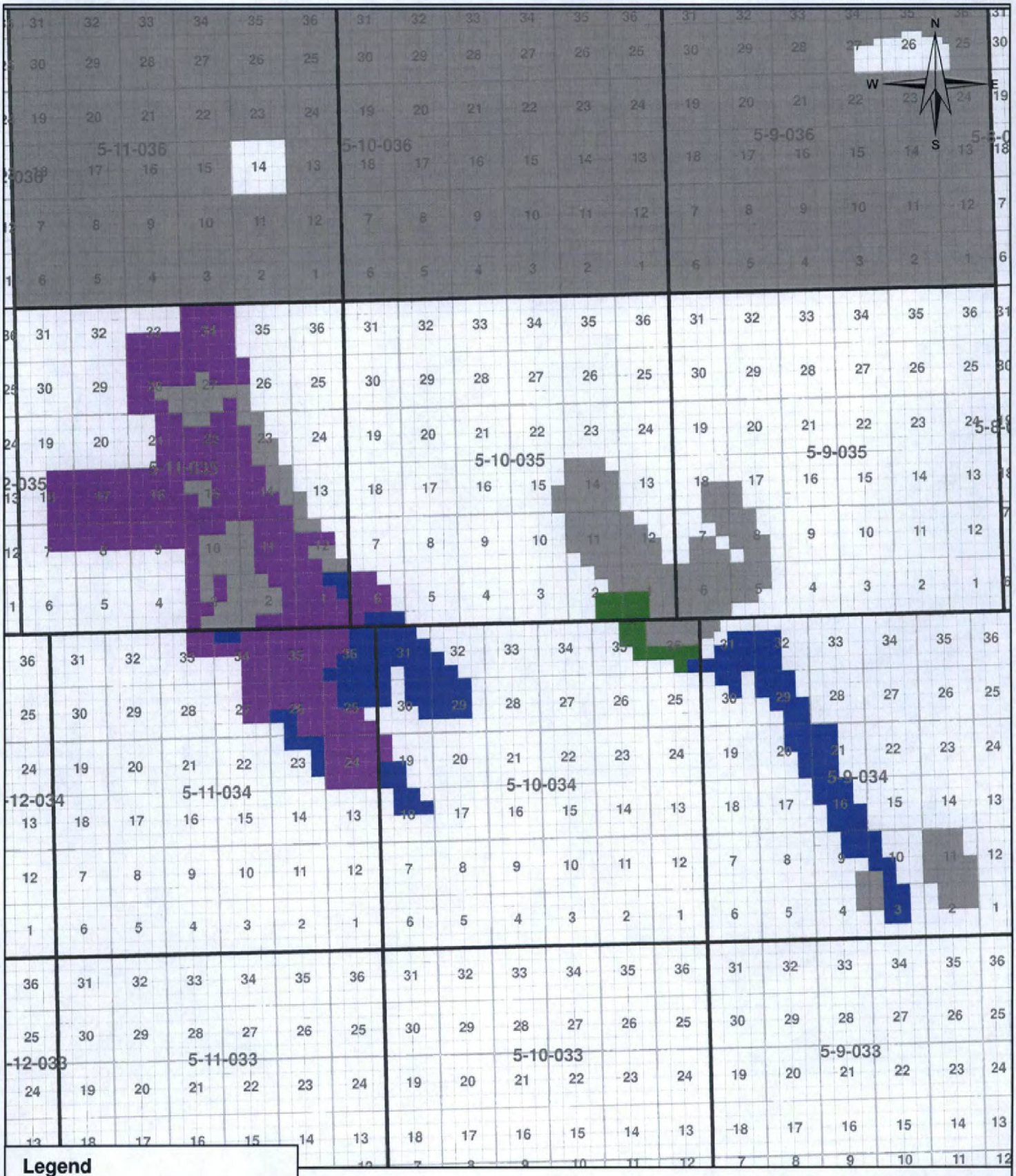
Edmonton, Alberta

CLEARWATER-LIMESTONE RANGES.
WEST-CENTRAL ALBERTA

Fig 3.2
Access Map

PK 2012.10



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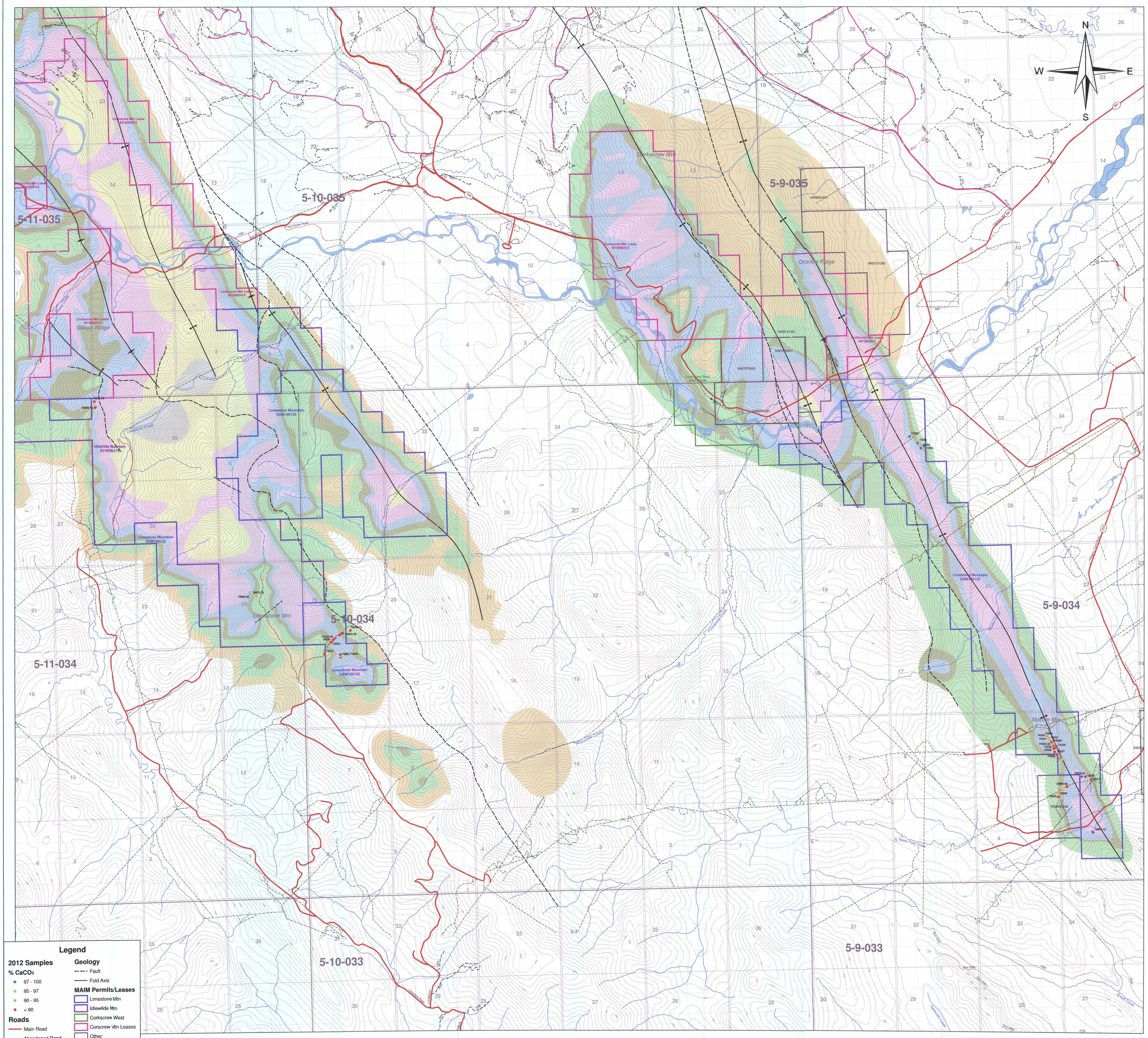
CLEARWATER- LIMESTONE RANGES
WEST-CENTRAL ALBERTA

Figure 4.1
Permit Map

WM 2012.10



Legend

2012 Samples

% $CaCO_3$

- 97 - 100
- 95 - 97
- 90 - 95
- < 90

Roads

- Main Road
- Abandoned Road
- Under Construction
- Deferred Road
- Future Road
- Maintained Road
- Other Disposition
- Reclaimed Raod
- Stabilized Road

Trails

- ATV
- Reclaimed
- Trail
- Cutline
- Contours (20 m)

Geology

- Fault
- Fold Axis

MAIM Permits/Leases

- Limestone Mtn
- Idlewilde Mtn
- Corkscrew West
- Corscrew Mtn Leases
- Other

Bedrock Geology

- Fernie
- Turner Valley
- Shunda
- Pekisko
- Banff
- Palliser
- Alexo
- Mt Hawk

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CLEARWATER- LIMESTONE RANGES
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Fig. 4.2
Geology & Sample Locations

KK 2012.10