MAR 20160006: IDLEWILDE MOUNTAIN

A report on Limestone exploration on the Idlewilde Mountain property near Rocky Mountain House.

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GRAYMONT WESTERN CANADA INC.

2015 EXPLORATION AND FIELDWORK WITHIN THE IDLEWILDE MOUNTAIN METALLIC AND INDUSTRIAL MINERALS PERMIT, WEST-CENTRAL ALBERTA

PART B

Metallic and Industrial Minerals Permit 9310060379

Geographic Coordinates

51°55 N to 52°04' N 115°24' W to 115°34' W

NTS Sheets 820/13, 820/14, 83B/03, 83B/04

Owner & Operator:	Graymont Western Canada Inc. Lime Divisional Office 260, 4311 - 12 Street N.E. Calgary, Alberta T2E 4P9
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Date Submitted:	April 11, 2016

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SUMMARY

During August 2015, parts of Limestone Range, west of Rocky Mountain House and within Metallic and Industrial Minerals (MAIM) Permit 9310060379, were explored for high-quality carbonate rocks. The 2015 exploration was a follow-up to previous exploration conducted in the area.

Access routes and outcrops were mapped, and a total of 114 rock samples were collected within the Idlewilde Mountain Permit, representing approximately 276 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°54' 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 2015 exploration within the Idlewilde Mountain Permit 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 Permit 9310060379, which encompass parts of Limestone Range of the Alberta Foothills. Bob Robison, exploration manager for Graymont Western U.S. Inc., authorized this work.

The objectives of the 2015 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 Permit 9310060379 encompasses areas within Limestone Range, surrounding and including Idlewilde Mountain and Limestone Mountain, Corkscrew Mountain and Simon Ridge within west-central Alberta (Fig. 3.1).

Approximately 7 km northwest of Burnco Quarry along Forestry Trunk Road 734 or 75 km southwest from Rocky Mountain House via Secondary Highway 752, Cutoff Creek Forestry Road heads westerly and provides access to the central part of Limestone Range, between

1.

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 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.

Limestone 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 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.

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 7,000, 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 Idlewilde Mountain Permit is included in the Eastern-Slope Montane Forest Ecological Region, and lies 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 property is 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. The property is cut by a number of creeks and rivers, including Cutoff, Rocky, and Limestone creeks, and Clearwater River.

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 64S instruments were used to mark outcrop locations and record access information. Compasses were set at a magnetic declination of 15°54' east.

4. **PROPERTY, EXPLORATION AND EXPENDITURES**

4.1 PROPERTY SUMMARY

MAIM Permit 9310060379 (Idlewilde Mountain) was acquired in 2010 to cover limestone exposures within Limestone Range, and is currently 4,736 ha in size.

Based on the 2015 exploration, the entirety of the Idlewilde Mountain Permit will be retained (Section 4.3, Fig. 4.1).

4.2 2015 EXPLORATION SUMMARY

From August 13 to 22, 2015, Dahrouge, on behalf of Graymont, 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 114 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 Idlewilde Mountain, along Limestone Range.

4.3 EXPLORATION EXPENDITURES

Expenditures for 2015 totaled \$46,791.04. The entirety of the Idlewilde Mountain (MAIM Permit 9310060379) Permit will be retained. Excess expenditures are to be assigned to future exploration periods.

MAIM Permit	Permit Area	Required	Assigned	New Expiry
	(ha)	Expenditures ¹	Expenditures	Date
9310060379	4,736	\$38,352.83	\$38,352.83	June 8, 2018

Expenditures are allocated to MAIM Permit 9310060379 as follows:

¹ Calculated from \$47,360.00 - previous credit of \$9,007.17

5.

REGIONAL GEOLOGY

5.1 STRATIGRAPHY

At Limestone Range, 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 that have been encountered within Idlewilde Mountain permit are 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.

System or Subsystem	Stratigraphic Unit						
	Assemblage	ormation					
	Group		omation				
		S	/				
		Mount Head					
	Rundle Assemblage		Turner Valley				
ower Carboniferous	_	¹ Livingstone	Shunda				
Lower Barbonnerous			Pekisko				
		Banff					
	Banff Assemblage	Exshaw	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~				
		1 Palliser					
		Alexo					
Upper Devonian	~~~~~~~~~		~~~~~				
	Fairholme Group°	Southesk	Mount Hawk				
		Cairn					
	~~~~~~~~~~	Dil	~~~~~				
		Pika Eldon					
Cambrian		Stephen					
		Cathedral					

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

* Compiled from MacKenzie 1969, Richards et al. 1994, Switzer et al., 1994 and Holter, 1994.

Fairholme Group of MacKenzle (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 Idlewilde Mountain Permit. 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 westcentral 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 Idlewilde Mountain Permit, 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.

#### RESULTS

Ten days were spent checking property access and outlining carbonate outcrops in detail. The 2015 exploration concentrated on defining stratigraphic unit locations and contacts within previously under-explored areas of the Idlewilde Mountain Permit.

Carbonate lithologies of the Rundle Assemblage, Banff Formation and Palliser Formation were examined and sampled within Limestone Range, near Cutoff Creek and along the flanks of Limestone Mountain (Fig. 4.2). A total of 114 discrete intervals were examined and sampled, representing approximately 276 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.

Although the Palliser Formation has some high-calcium limestone potential, no samples were examined or collected during the 2015 exploration program.

The Banff Formation is not considered a unit of interest due to its low CaCO₃ values and high SiO₂ content. No samples of Banff Formation were collected during the 2015 exploration program.

The entirety of outcrops visited in 2015 were within the Pekisko Formation. Analytical results were variable, presumably due to the fact that different members within the formation were sampled. The best sample interval was within Section 2015-01, which averaged 97.12% CaCO₃, 1.23% MgCO₃ and 1.07% SiO₂ over approximately 23 m, and was collected south of Limestone Creek (Fig. 4.2). Several other sample sections and isolated intervals returned values in excess of 95% CaCO₃ over several metres; however, MgCO₃, and minor SiO₂ impurities were common in many intervals. The high-quality Pekisko intervals generally consist of resistant, thick-bedded to massive, light- to medium-brownish-grey, fine- to coarse-grained crinoidal lime wackestone to grainstone. Lower quality intervals generally consist of less resistant, moderate to well-bedded, medium-brownish-grey, micritic to fine-grained lime mudstone to packstone. Overall, the Pekisko Formation has the greatest high-calcium limestone potential in the area.

The Shunda Formation consists of low-quality, recessive, argillaceous mudstones, and is not considered a unit of interest. No samples of Shunda Formation were collected during the 2015 exploration project.

The Turner Valley Formation consists of vuggy, light-tan-grey, fine-grained, dolomitic mudstone to wackestone. Previous exploration projects have revealed the Turner Valley Formation to have high-quality dolomite potential. No samples of the Turner Valley Formation were collected during the 2015 exploration project.

6.

7.

# CONCLUSIONS

Carbonate units of the Pekisko Formation were examined and measured along Limestone Range and near Cutoff Creek, within MAIM Permit 9310060379. A total of 114 discrete intervals were sampled and described in detail. Based on the samples collected during the 2015 exploration and overall property assessment, the entirety of the Idlewilde Mountain Permit will be retained.

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. Drill-testing of the Pekisko and/or Turner Valley formations would also be beneficial.

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# STATEMENT OF QUALIFICATIONS

I, Kelly Krueger, residing at

9.

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 2012 graduate of the University of Alberta, Edmonton, Alberta with a B.Sc. in Geology.
- I have practiced my profession as a geologist continuously since 2012.
- I am a registered Geologist-in-Training with the Association of Professional Engineers and Geoscientists of Alberta, member M96506.
- I hereby consent to the copying or reproduction of this Assessment Report following the one-year confidentiality period.
- I am a co-author of the report entitled "2015 Exploration and Fieldwork within the Idlewilde Mountain Metallic and Industrial Minerals Permit, West-Central Alberta" and accept responsibility for the veracity of technical data and results.

Dated this 8th day of April, 2016.

Kelly Krueger, B.Sc., Geo.I.T.

APEGA M96506

# ITEMIZED COST STATEMENT FOR THE 2015 EXPLORATION WITHIN THE IDLEWILDE METALLIC AND INDUSTRIAL MINERALS PERMIT

# a) <u>Personnel</u>

1

0.26	geol days - days	ogis @	st office \$ 990.00	Project supervision budgeting, bookings, ship samples	\$	261.71	
0.20	geolog	-	¢ 000.00		•		
1.85	days	,	office	Project supervision budgeting, bookings, ship samples			
1.85	days	@	\$ 795.00		\$	1,471.11	
9.50	geolog days	gist	field	Field management, geological mapping and rock sampling (Aug 13-22)			
<u>6.44</u> 15.94	_ days days	@	office \$ 520.00	Field preparations, budgeting, bookings	\$	8,291.32	
9.50 6.55 16.05	assista days days days days	nt @	field office \$ 475.00	Geological mapping and rock sampling (Aug 13-22) Field preparations, data entry, GIS compilation	\$	7,624.03	
9.50 <u>1.13</u> 10.63	assist days days days days	tant @	field office \$ 350.00	Geological mapping and rock sampling (Aug 13-22) Field preparations, data entry, GIS compilation	\$	3,719.15	
9.50 0.00 9.50	assistant days days days days	@	field office \$ 350.00	Geological mapping and rock sampling (Aug 13-22) Field preparations, data entry, GIS compilation	\$	3,325.00	
0.26	receptioni hours hours	ist @	office \$ 42.00	Logistics, shipping	\$	10.92	\$ 24,441.53
<b>b) <u>Food a</u></b> 28 38	nd Accomr man-days man-days	@	\$ 146.98	accommodations meals	69 (A	4,115.45 <u>2,</u> 299.00	\$ 6,414.45
c) <u>Trans</u> ţ	<u>portation</u>			Rental 9 trailer - Pioneer rentals ahrouge owned	\$	1,646.01 2,610.52 2,854.98 34.26 668.54	\$ 7,814.32

d) <u>Instrument Rental</u>	Radio (2) SPOT Locators (2) GPS (2)	\$ \$ \$	54.38 67.97 67.97	\$	190.33
e) <u>Drilling</u>	n/a				
f) <u>Analyses</u> 114 samples @ 114 samples @ g) <u>Other</u>	\$ 25.00 sample analysis	\$	513.00 2,850.00 20.82	\$	3,363.00
	Misc. Supplies Courier Software Rental (GIS)	\$ \$ \$	162.11 130.75 	\$	313.68
Total				\$	42,537.31
Administration (10%) Total + Administratio				\$ \$	4,253.73 <b>46,791.04</b>

Edmonton, Alberta April 8, 2016 K. Krueger, B.Sc., Geo. I.T.

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<b>DAHRO</b> GEOLOG CONSULTIN	ICAL Sec								ä		T	
Sample	Strat Unit	Strat Tkns (m)	Description	CaCO ₃ (%)	MgCO ₃ (%)	SiO₂ (%)	Al₂O₃ (%)		SrO (ppm)(		P₂O₅ ppm)	
Isolated Sa	amples											
126862 UTM 608	Mpk 358E, 57	1 59534N	Lime Packstone to Lime Grainstone, medium grey weathered and fresh, micritic to coarse-grained, fossils: fragment (indeterminate), rare; crinoid stem, abundant; crinoid ossicle, abundant, massive, resistant, strong HCI reaction	98.70	1.11	0.35	0.070	0.090	297	32	50	
126863 UTM 608	Mpk 364E, 57	ุ1 59541N	Lime Packstone to Lime Grainstone, medium grey weathered and fresh, micritic to coarse-grained, fossils: fragment (indeterminate), rare; crinoid stem, abundant; crinoid ossicle, abundant, massive, resistant, strong HCI reaction, structure(s): bedding (possible), local-scale, 173/9 SW	94.06	1.86	3.66	0.080	0.100	436	38	50	
126903 UTM 604	Mpk 683E, 57	1.75 57583N	Dolomitic Lime Packstone to Dolomitic Lime Wackestone, light grey to light brown-grey weathered, medium grey to dark grey fresh, micritic to coarse-grained, fossils: crinoid stem, common; crinoid ossicle, common, moderately-bedded, resistant, moderate, vuggy (calcite-filled), alteration: oxide, localized, very weak intensity, moderate HCl reaction, structure(s): calcite veinlet, outcrop-scale, weak; bedding (definite), outcrop-scale, 144/10 SW	89.95	6.25	2.53	0.430	0.380	329	76	50	
126923 UTM 603	Mpk 719E, 57	grab 63512N	<b>Dolomitic Mudstone</b> , light grey to medium grey weathered, light tan-grey fresh, micritic to fine-grained, vuggy (calcite-filled), vuggy (open), alteration: oxide, localized, weak intensity, very weak HCI reaction	58.36	41.29	1.04	0.140	0.300	98	107	50	C1
126924 UTM 603	Mpk 692E, 57	grab 63485N	Calcareous Dolomitic Mudstone, light grey to medium grey weathered, dark grey fresh, micritic, hard, vuggy (calcite-filled), alteration: oxide, localized, weak intensity, moderate HCI reaction	65.50	28.97	4.15	0.440	0.170	165	54	403	
126927 UTM 603	Mpk 8658E, 57	2 63530N	<b>Dolomitic Lime Mudstone</b> , light grey to medium grey weathered, dark grey to very-dark grey fresh, cryptocrystalline to micritic, thickly-bedded, slightly resistant, moderate, homogeneous, vuggy (calcite-filled), blocky, alteration: oxide, localized, weak intensity, moderate HCI reaction	91.02	7.87	0.41	0.070	0.290	397	78	50	
126931 UTM 603	Mpk 8697E, 57	3.5 63630N	Slightly Dolomitic Lime Grainstone, light grey weathered, medium grey fresh, coarse-grained to very coarse-grained, fossils: ooid, rare; crinoid stem, abundant; crinoid ossicle, abundant, thinly-bedded to moderately-bedded, moderate, vuggy (calcite-filled), alteration: oxide, fracture-related, weak intensity, moderate HCI reaction	95.31	4.06	0.68	0.080	0.140	226	52	50	
Section 20	015-01 (U	TM 608401E	<u>, 5759569N)</u>									
126864	Mpk	2	Argillaceous Lime Mudstone to Siliceous Lime Packstone, medium grey to light grey weathered, medium grey fresh, micritic to fine-grained, fossils: crinoid ossicle, abundant, massive, resistant, strong HCI reaction, structure(s): calcite veinlet, local-scale, weak; beddirg (possible), local-scale, weak, 190/36 NW	93.34	0.96	4.23	0.070	0.070	394	30	50	
126865	Mpk	0.5	Argillaceous Lime Mudstone to Siliceous Lime Grainstone, light grey weathered, light grey to medium grey fresh, micritic to medium-grained, fossils: crinoid stem, abundant; crinoid ossicle, abundant, massive, resistant, moderate HCI reaction, structure(s): calcite veinlet, local-scale, weak	82.46	0.77	11.93	0.060	0.130	342	39	171	

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Sample	Strat Unit	Strat Tkns (m)	Description	CaCO ₃ (%)	MgCO₃ (%)	SiO₂ (%)	Al ₂ O3 (%)	Fe ₂ O ₃ (%)	SrO (ppm)	MnO (ppm) (	P₂O₅ ppm)
126866	Mpk	1	Lime Mudstone to Lime Wackestone, light grey weathered, light grey to medium grey fresh, micritic to medium-grained, fossils: crinoid stem, common; crinoid ossicle, common, massive, resistant, moderate HCl reaction, structure(s): calcite veinlet, local-scale, weak	97.81	0.86	0.87	0.060	0.060	317	29	50
126867	Mpk	1	Lime Packstone to Lime Grainstone, medium grey weathered, light grey to medium grey fresh, micritic to coarse-grained, fossils: crinoid stem, abundant; crinoid ossicle, abundant; brachiopod, rare, massive, resistant, weak fetid odour, strong HCI reaction	97.45	2.24	0.38	0.070	0.060	298	27	50
126868	Mpk	1	<b>Dolomitic Lime Packstone to Dolomitic Lime Grainstone</b> , medium grey weathered, light grey to medium grey fresh, micritic to coarse-grained, fossils: crinoid stem, abundant; crinoid ossicle, abundant; brachiopod, rare, massive, resistant, weak fetid odour, strong HCI reaction	92.81	6.38	0.89	0.090	0.130	285	42	50
126869	Mpk	2.5	Lime Mudstone, medium grey weathered and fresh, micritic, massive, resistant, cherty, nodular, strong HCI reaction, structure(s): calcite veinlet, local-scale, weak	98.16	0.90	0.33	0.080	0.080	472	28	50
126870	Mpk	1.5	Lime Mudstone, medium grey weathered and fresh, micritic, massive, resistant, cherty, nodular, strong HCI reaction, structure(s): calcite veinlet, local-scale, weak	97.81	0.92	0.40	0.080	0.090	500	33	50
126871	Mpk	1	Lime Mudstone, medium grey weathered and fresh, micritic, massive, resistant, cherty, nodular, strong HCI reaction, structure(s): calcite veinlet, outcrop-scale, weak	97.98	0.86	0.32	0.060	0.090	446	31	50
126872	Mpk	1.5	Lime Mudstone, medium grey weathered and fresh, micritic, massive, resistant, cherty, nodular, strong HCI reaction, structure(s): calcite veinlet, outcrop-scale, weak; bedding (approximate), outcrop-scale, 177/25 W	97.98	0.88	0.61	0.070	0.050	390	27	50
126873	Mpk	2.5	Lime Mudstone, medium grey weathered and fresh, micritic, massive, resistant, cherty, nodular, strong HCI reaction, structure(s): calcite veinlet, outcrop-scale, weak; bedding (undulatory), outcrop-scale, 179/22 W; bedding (undulatory), outcrop-scale, 174/25 W	97.63	1.00	0.97	0.080	0.070	366	33	50
126874	Mpk	2.5	Lime Mudstone, medium grey weathered and fresh, micritic, massive, resistant, cherty, nodular, strong HCI reaction, structure(s): calcite veinlet, outcrop-scale, weak; bedding (approximate), outcrop-scale, 255/30 NW	97.98	0.96	0.35	0.090	0.180	409	36	50
126875	Mpk	2.5	Lime Grainstone, medium grey weathered and fresh, medium-grained to coarse-grained, massive, resistant, strong HCl reaction, structure(s): calcite veinlet, outcrop-scale, weak; bedding (possible), outcrop-scale, 243/20 NW	98.80	0.89	0.29	0.060	0.060	386	29	50
126876	Mpk	2.25	Lime Wackestone to Lime Packstone, medium grey weathered, medium grey to medium brown-grey fresh, micritic to medium-grained, thickly-bedded to massively-bedded, resistant, blocky, moderate HCI reaction, structure(s): calcite veinlet, outcrop-scale, weak	98.60	0.96	0.30	0.060	0.090	429	31	50
126877	Mpk	1	Lime Wackestone to Lime Packstone, medium grey weathered, medium grey to medium brown-grey fresh, micritic to medium-grained, thickly-bedded to massively-bedded, resistant, blocky, moderate HCl reaction, structure(s): calcite veinlet, outcrop-scale, weak	98.52	1.15	0.41	0.080	0.110	420	34	50
Section 20	015-02 (U	TM 607359E	<u>, 5754332N)</u>								
126878	Mpk	2.75	Strongly Dolomitic Lime Mudstone to Strongly Dolomitic Lime Packstone, very-light grey weathered, light grey to medium grey fresh, micritic to medium-grained, fossils: fragment.(indeterminate), rare; crinoid stem, common; crinoid ossicle, common, thickly-bedded, cherty, weak fetid odour, moderate HCI reaction, structure(s): bedding (approximate), outcrop-scale, 160/36 SW	84.20	14.60	1.09	0.100	0.080	339	31	50

Sample	Strat Unit	Strat Tkns (m)	Description	CaCO₃ ( (%)	MgCO₃ (%)	SiO₂ (%)	Al ₂ O3 (%)	Fe ₂ O ₃ (%)		MnO (ppm) (	P₂O₅ (ppm)
126879	Mpk	2	Lime Grainstone, very-light grey weathered, light grey to medium grey fresh, medium-grained to coarse-grained, fossils: fragment (indeterminate), rare; crinoid stem, abundant; crinoid ossicle, abundant, thickly-bedded to massively-bedded, resistant, strong HCl reaction, structure(s): bedding (approximate), outcrop-scale, 148/30 SW	98.16	1.34		0.060		423	27	50
126880	Mpk	3	Lime Wackestone to Lime Packstone, very-light grey weathered, light grey to medium grey fresh, micritic to coarse-grained, fossils: fragment (indeterminate), rare; crinoid stem, common; crinoid ossicle, common, thickly-bedded to massively-bedded, resistant, strong HCI reaction, structure(s): bedding (approximate), outcrop-scale, 148/30 SW	97.27	2.07	0.50	0.070	0.090	405	27	50
126881	Mpk	1.75	Lime Wackestone to Lime Packstone, very-light grey weathered, light grey to medium grey fresh, micritic to coarse-grained, fossils: fragment (indeterminate), rare; crinoid stem, common; crinoid ossicle, common, thickly-bedded to massively-bedded, resistant, strong HCl reaction, structure(s): bedding (approximate), outcrop-scale, 153/39 SW	98.16	1.19	0.20	0.060	0.140	377	38	50
126882	Mpk	2	Lime Wackestone to Lime Packstone, very-light grey weathered, light grey to medium grey fresh, micritic to coarse-grained, fossils: fragment (indeterminate), rare; crinoid stem, common; crinoid ossicle, common, thickly-bedded to massively-bedded, resistant, strong HCI reaction	98.52	1.19	0.17	0.050	0.090	329	30	50
126883	Mpk	3.75	Lime Grainstone to Lime Wackestone, very-light grey weathered, light grey to medium grey fresh, micritic to coarse-grained, fossils: fragment (indeterminate), rare; crinoid stem, abundant; crinoid ossicle, abundant, thickly-bedded to massively-bedded, resistant, strong HCI reaction, structure(s): bedding (approximate), outcrop-scale, 151/29 SW	98.88	1.09	0.16	0.070	0.120	344	36	50
Section 20	)15-03 (U	TM 607377E	<u>, 5754431N)</u>								
126884	Mpk	0.75	Strongly Dolomitic Lime Mudstone to Strongly Dolomitic Lime Wackestone, very-light grey weathered, medium grey to dark grey fresh, micritic to coarse-grained, fossils: fragment (indeterminate), very rare; crinoid stem, rare; crinoid ossicle, rare, thickly-bedded to massively-bedded, resistant, moderate HCI reaction	86.74	12.32	1.04	0.190	0.160	279	50	50
126885	Mpk	8.5	Lime Mudstone, light grey to very-light grey weathered, medium grey to dark grey fresh, micritic, moderately-bedded, resistant, blocky, homogeneous, moderate HCI reaction, structure(s): bedding (approximate), outcrop-scale, 148/26 SW	96.20	1.92	1.01	0.160	0.210	325	53	50
126886	Mpk	2.75	Lime Mudstone, light grey to very-light grey weathered, medium grey to dark grey fresh, micritic, moderately-bedded, resistant, blocky, homogeneous, strong HCI reaction, structure(s): bedding (approximate), outcrop-scale, 145/28 SW	97.63	1.13	0.85	0.120	0.140	297	42	50
Section 20	015-04 (U	TM 607431E	<u>, 5754487N)</u>								
126887	Mpk	2.25	Lime Mudstone, very-light grey to light grey weathered, tan to medium grey fresh, micritic, thickly-bedded to massively-bedded, resistant, vuggy (calcite-filled), strong HCl reaction, structure(s): fracture, outcrop-scale, moderate; calcite veinlet, outcrop-scale, weak	97.27	1.40	0.70	0.110	0.190	352	47	50
126888	Mpk	1	Lime Mudstone, very-light grey to light grey weathered, tan to medium grey fresh, micritic, thickly-bedded to massively-bedded, resistant, vuggy (calcite-filled), moderate HCl reaction, structure(s): fracture, outcrop-scale, moderate; calcite veinlet, outcrop-scale, weak	98.16	1.13	0.52	0.110	0.100	299	29	50
126889	Mpk	1	Lime Mudstone, very-light grey to light grey weathered, tan to medium grey fresh, micritic, thickly-bedded to massively-bedded, resistant, vuggy (calcite-filled), moderate HCl reaction, structure(s): fracture, outcrop-scale, moderate; calcite veinlet, outcrop-scale, weak; bedding (approximate), outcrop-scale, 140/20 SW; bedding (approximate), outcrop-scale, 135/27 SW	96.91	1.05	1.02	0.090	0.070	352	25	50

Sample	Strat Unit	Strat Tkns (m)	Description	CaCO₃ (%)	MgCO₃ (%)	SiO₂ (%)	AI₂O₃ (%)	Fe ₂ O ₃ (%)		MnO (ppm)	P₂O₅ (ppm)
Section 20	)15-05 (U	TM 607632E	<u>, 5754320N)</u>								
126890	Mpk	4	Lime Packstone to Lime Grainstone, very-light grey weathered, light grey to medium grey fresh, micritic to coarse-grained, fossils: solitary rugose coral, rare; fragment (indeterminate), rare; crinoid stem, common; crinoid ossicle, common, thickly-bedded to massively-bedded, resistant, strong HCI reaction	98.34	0.88	0.18	0.070	0.080	255	32	50
126891	Mpk	2.5	Lime Packstone to Lime Grainstone, very-light grey weathered, light grey to medium grey fresh, micritic to coarse-grained, fossils: solitary rugose coral, rare; fragment (indeterminate), rare; crinoid stem, common; crinoid ossicle, common, thickly-bedded to massively-bedded, resistant, strong HCI reaction	97.27	1.63	0.25	0.090	0.270	279	30	50
126892	Mpk	2	Slightly Dolomitic Lime Packstone to Slightly Dolomitic Lime Grainstone, very-light grey weathered, light grey to medium grey fresh, micritic to coarse-grained, fossils: solitary rugose coral, rare; fragment (indeterminate), rare; crinoid stem, abundant; crinoid ossicle, abundant, thickly-bedded to massively-bedded, resistant, strong HCI reaction, structure(s): bedding (approximate), outcrop-scale, 167/31 SW	94.24	4.06	0.69	0.100	0.180	263	42	50
126893	Mpk	1.75	Slightly Dolomitic Lime Packstone to Slightly Dolomitic Lime Grainstone, very-light grey weathered, light grey to medium grey fresh, micritic to coarse-grained, fossils: solitary rugose coral, rare; fragment (indeterminate), rare; crinoid stem, abundant; crinoid ossicle, abundant, thickly-bedded to massively-bedded, resistant, strong HCI reaction	94.77	3.05	0.78	0.110	0.520	386	31	50
126894	Mpk	3.75	Lime Packstone to Lime Grainstone, very-light grey weathered, light grey to medium grey fresh, micritic to coarse-grained, fossils: solitary rugose coral, rare; fragment (indeterminate), rare; crinoid stem, abundant; crinoid ossicle, abundant, thickly-bedded to massively-bedded, resistant, strong HCI reaction, structure(s): bedding (undulatory), outcrop-scale, 155/20 SW	98.16	1.07	0.35	0.060	0.100	379	32	50
126895	Mpk	2.5	Lime Packstone to Lime Grainstone, very-light grey weathered, light grey to medium grey fresh, micritic to coarse-grained, fossils: solitary rugose coral, rare; fragment (indeterminate), rare; crinoid stem, abundant; crinoid ossicle, abundant, thickly-bedded to massively-bedded, resistant, strong HCI reaction	97.63	1.15	0.15	0.080	0.400	390	31	50
126896	Mpk	2.5	Lime Packstone to Lime Grainstone, very-light grey weathered, light grey to medium grey fresh, micritic to coarse-grained, fossils: solitary rugose coral, rare; fragment (indeterminate), rare; crinoid stem, abundant; crinoid ossicle, abundant, thickly-bedded to massively-bedded, resistant, strong HCI reaction, structure(s): bedding (approximate), outcrop-scale, 145/25 SW	98.52	1.15	0.23	0.060	0.120	357	32	50
126897	Mpk	0.5	Lime Mudstone to Lime Packstone, light grey weathered, medium grey fresh, micritic to medium-grained, fossils: solitary rugose coral, rare; crinoid stem, abundant; crinoid ossicle, abundant, resistant, vuggy (calcite-filled), strong HCI reaction	98.70	1.17	0.18	0.060	0.060	352	25	50
126898	Mpk	3.5	<b>Dolomitic Lime Mudstone to Dolomitic Lime Packstone</b> , light grey weathered, medium grey fresh, micritic to medium-grained, fossils: solitary rugose coral, rare; crinoid stem, abundant; crinoid ossicle, abundant, resistant, vuggy (calcite-filled), strong HCI reaction, structure(s): bedding (approximate), outcrop-scale, 125/20 SW	92.81	5.88	0.66	0.160	0.170	350	49	50
126899	Mpk	2.75	Lime Mudstone to Lime Packstone, light grey weathered, medium grey fresh, micritic to medium-grained, fossils: solitary rugose coral, rare; crinoid stem, abundant; crinoid ossicle, abundant, resistant, vuggy (calcite-filled), strong HCI reaction	94.95	1.92	2.50	0.260	0.120	330	37	50
126900	Mpk	4	Lime Mudstone to Lime Packstone, light grey weathered, medium grey fresh, micritic to medium-grained, fossils: solitary rugose coral, rare; crinoid stem, abundant; crinoid ossicle, abundant, resistant, vuggy (calcite-filled), strong HCI reaction	97.45	1.21	0.46	0.120	0.460	343	41	50

Sample	Strat Unit	Strat Tkns (m)	Description	CaCO₃ (%)	MgCO₃ (%)	SiO₂ (%)	Al ₂ O ₃ (%)	Fe ₂ O ₃ (%)	SrO (ppm)		P₂O₅ (ppm)
126901	Mpk	2.5	Lime Mudstone, very-light grey to light grey weathered, medium grey to medium brown-grey fresh, micritic, moderately-bedded to thickly-bedded, resistant, vuggy (calcite-filled), strong HCI reaction, structure(s): calcite veinlet, outcrop-scale, weak; bedding (definite), outcrop-scale, 140/20 SW	97.81	1.05	0.70	0.120	0.070	293	26	50
126902	Mpk	1	Lime Mudstone, very-light grey to light grey weathered, medium grey to medium brown-grey fresh, micritic, moderately-bedded to thickly-bedded, resistant, vuggy (calcite-filled), strong HCI reaction, structure(s): calcite veinlet, outcrop-scale, weak; bedding (definite), outcrop-scale, 149/15 SW	97.63	1.15	0.69	0.090	0.070	318	30	50
Section 20	)15-06 (U	TM 604675E	<u>. 5757583N)</u>								
126904	Mpk	3	<b>Dolomitic Lime Packstone</b> , light grey to light tan-grey weathered, light grey to medium grey fresh, micritic to coarse-grained, fossils: crinoid stem, rare; crinoid ossicle, rare, slightly resistant, moderate, moderate HCl reaction, structure(s): calcite veinlet, outcrop-scale, weak	92.70	6.80	0.26	0.080	0.090	217	44	50
126905	Mpk	2.75	Slightly Dolomitic Lime Grainstone to Slightly Dolomitic Lime Packstone, light grey to very-light grey weathered, medium grey to light grey fresh, micritic to coarse-grained, fossils: crinoid stem, abundant; crinoid ossicle, abundant, massive, resistant, moderate, vuggy (calcite-filled), moderate HCl reaction, structure(s): calcite veinlet, outcrop-scale, weak	96.70	2.90	0.21	0.070	0.060	246	34	50
126906	Mpk	2.5	Slightly Dolomitic Lime Grainstone, light grey to very-light grey weathered, light grey to medium grey fresh, coarse-grained to very coarse-grained, fossils: crinoid stem, abundant; crinoid ossicle, abundant, massive, resistant, moderate, moderate HCI reaction	97.10	2.48	0.21	0.080	0.110	194	32	50
126907	Mpk	3	Lime Grainstone, light grey to medium grey weathered, medium grey fresh, coarse-grained to very coarse-grained, fossils: crinoid stem, abundant; crinoid ossicle, abundant, massive, resistant, moderate, alteration: oxide, localized, very weak intensity, moderate HCI reaction, structure(s): calcite veinlet, local-scale, weak	98.10	1.53	0.17	0.070	0.160	225	38	50
126908	Mpk	3.5	<b>Dolomitic Lime Grainstone</b> , light grey to medium grey weathered, medium grey fresh, coarse-grained to very coarse-grained, fossils: crinoid stem, abundant; crinoid ossicle, abundant, massive, resistant, moderate, alteration: oxide, localized, weak intensity, moderate HCl reaction, structure(s): calcite veinlet, outcrop-scale, weak	93.30	6.18	0.32	0.060	0.130	205	48	50
126909	Mpk	1.75	Strongly Dolomitic Lime Packstone to Strongly Dolomitic Lime Mudstone, light grey weathered, medium grey to light grey fresh, micritic to very coarse-grained, fossils: crinoid stem, abundant; crinoid ossicle, abundant, massive, recessive, soft, cherty, weak HCl reaction	81.10	18.00	0.69	0.110	0.150	180	54	50
126910	Mpk	2.5	Strongly Dolomitic Lime Packstone, light grey weathered, medium grey to light grey fresh, micritic to very coarse-grained, fossils: crinoid stem, abundant; crinoid ossicle, abundant, massive, recessive, soft, cherty, moderate HCI reaction	87.10	11.84	0.47	0.120	0.410	213	41	50
126911	Mpk	3.25	<b>Dolomitic Lime Grainstone</b> , light grey to medium grey weathered, medium grey fresh, coarse-grained to very coarse-grained, fossils: crinoid stem, abundant; crinoid ossicle, abundant, massive, recessive, soft, alteration: oxide, localized, very weak intensity, strong HCl reaction, structure(s): calcite veinlet, outcrop-scale, weak	93.88	5.73	0.35	0.090	0.080	254	30	50
126912	Mpk	1.75	<b>Dolomitic Lime Grainstone</b> , light grey weathered, medium grey fresh, coarse-grained to very coarse-grained, fossils: ooid, rare; crinoid stem, abundant; crinoid ossicle, abundant, massive, recessive, moderate, homogeneous, sucrosic, alteration: oxide, localized, very weak intensity, moderate HCl reaction, structure(s): calcite veinlet, outcrop-scale, very weak	94.06	4.62	0.44	0.140	0.540	274	38	50

Sample	Strat Unit	Strat Tkns (m)	Description	CaCO ₃ (%)	MgCO₃ (%)	SiO₂ (%)	Al ₂ O3 (%)	Fe ₂ O ₃ (%)	SrO (ppm)		P₂O₅ ppm)
126913		3.75	, weathered and fresh,	97.45	1.28	0.33	0.120	0.460	288	35	50
126914	Mpk	1.5	<b>Dolomitic Lime Packstone</b> , light grey to medium grey weathered, medium grey to dark grey fresh, micritic to coarse-grained, fossils: ooid, common; crinoid stem, abundant; crinoid ossicle, abundant, massive, recessive, moderate, nodular, alteration: oxide, localized, very weak intensity, moderate HCI reaction	91.92	7.34	0.64	0.090	0.110	255	38	50
126915	Mpk	4.5	Lime Wackestone to Lime Packstone, light grey to medium grey weathered, very-dark grey fresh, micritic to coarse-grained, fossils: ooid, rare; crinoid stem, common; crinoid ossicle, common, massive, resistant, hard, blocky, moderate HCl reaction	96.91	1.42	0.27	0.080	0.520	325	35	50
126916	Mpk	3	Lime Packstone, very-light grey weathered, medium grey to dark grey fresh, micritic to coarse-grained, fossils: ooid, common; crinoid stem, common; crinoid ossicle, common, massive, resistant, hard, blocky, moderate HCI reaction	97.63	1.36	0.26	0.050	0.080	334	29	50
126917	Mpk	3.5	Strongly Dolomitic Lime Wackestone to Strongly Dolomitic Lime Packstone, very-light grey weathered, very-dark grey fresh, micritic to very coarse-grained, fossils: crinoid stem, abundant; crinoid ossicle, abundant, massive, resistant, hard, blocky, moderate HCI reaction	88.52	10.06	0.80	0.110	0.090	271	36	50
126918	Mpk	2	<b>Calcareous Dolomitic Mudstone to Calcareous Dolomitic Packstone</b> , light grey weathered, dark grey to very-dark grey fresh, cryptocrystalline to coarse-grained, fossils: crinoid stem, common; crinoid ossicle, common, massive, recessive, soft, alteration: oxide, localized, weak intensity, moderate HCI reaction	67.82	29.20	2.11	0.260	0.190	183	59	171
126919	Mpk	3	<u>Strongly Dolomitic Lime Mudstone</u> , light grey weathered, medium grey to dark grey fresh, micritic, thickly-bedded, recessive, hard, vuggy (calcite-filled), blocky, moderate HCl reaction, structure(s): bedding (approximate), outcrop-scale, 170/11 W	82.10	13.87	3.34	0.190	0.140	224	45	138
126920	Mpk	2.75	Strongly Dolomitic Lime Mudstone to Strongly Dolomitic Lime Wackestone, light grey weathered, medium grey to tan-grey fresh, cryptocrystalline to medium-grained, moderately-bedded, resistant, hard, vuggy (calcite-filled), alteration: oxide, localized, weak intensity, moderate HCI reaction		15.23	0.92	0.130	0.150	272	44	50
126921	Mpk	3.75	<b>Dolomitic Lime Mudstone</b> , light grey weathered, tan-grey fresh, cryptocrystalline to micritic, thinly-bedded to moderately-bedded, resistant, moderate, argillaceous, homogeneous, vuggy (calcite-filled), alteration: oxide, localized, weak intensity, moderate HCI reaction	92.45	5.06	1.36	0.220	0.350	338	37	50
126922	Mpk	3	<u>Strongly Dolomitic Lime Mudstone</u> , light grey weathered, tan-grey fresh, cryptocrystalline to micritic, thinly-bedded to moderately-bedded, resistant, moderate, vuggy (calcite-filled), argillaceous, homogeneous, alteration: oxide, localized, very weak intensity, moderate HCI reaction, structure(s): bedding (approximate), outcrop-scale, 148/14 SW	87.10	10.56	1.74	0.220	0.160	292	43	50
Section 20	01 <u>5-07 (U</u>	TM 603661E	<u>, 5763493N)</u>								
126925	Mpk	4	<b>Dolomitic Lime Mudstone</b> , light grey to medium grey weathered, dark grey to very-dark grey fresh, micritic, thickly-bedded to massively-bedded, resistant, moderate, homogeneous, alteration: oxide, localized, very weak intensity, moderate HCI reaction, structure(s): fracture, outcrop-scale, weak; bedding (definite), outcrop-scale, 175/19 W	93.70	5.48	0.28	0.060	0.130	375	45	50
126926	Mpk	1.25	<b>Strongly Dolomitic Lime Mudstone</b> , light grey to medium grey weathered, dark grey to very-dark grey fresh, cryptocrystalline to micritic, thickly-bedded to massively-bedded, slightly resistant, moderate, homogeneous, alteration: oxide, localized, weak intensity, moderate HCI reaction, structure(s): fracture, outcrop-scale, weak; calcite veinlet, outcrop-scale, weak	73.71	14.24	8.88	0.600	0.360	370	71	50

Sample	Strat Unit	Strat Tkns (m)	Description	CaCO₃ (%)	MgCO₃ (%)	SiO₂ (%)	Al ₂ O3 (%)			MnO (ppm)	P₂O₅ (ppm)
Section 20	15-08 (U	TM 603682E,	5763583N)								
126928	Mpk	3.25	Lime Packstone to Lime Wackestone, light grey weathered, medium grey to dark grey fresh, micritic to coarse-grained, fossils: crinoid stem, abundant; crinoid ossicle, abundant, moderately-bedded to thickly-bedded, resistant, moderate, vuggy (calcite-filled), alteration: oxide, localized, very weak intensity, strong HCI reaction, structure(s): bedding (definite), outcrop-scale, 128/29 SW	97.45	1.38	0.72	0.080	0.100	296	38	131
126929	Mpk	3	Slightly Dolomitic Lime Packstone to Slightly Dolomitic Lime Grainstone, light grey weathered, medium brown-grey to dark brown-grey fresh, micritic to very coarse-grained, fossils: crinoid stem, abundant; crinoid ossicle, abundant, moderately-bedded, resistant, moderate, blocky, alteration: oxide, localized, very weak intensity, moderate HCI reaction	95.49	2.78	0.90	0.090	0.150	307	38	50
126930	Mpk	2.25	<u>Strongly Dolomitic Lime Packstone</u> , light grey weathered, medium brown-grey fresh, micritic to coarse-grained, fossils: solitary rugose coral, rare; crinoid stem, common; crinoid ossicle, common, thinly-bedded to moderately-bedded, resistant, moderate, vuggy (calcite-filled), alteration: oxide, localized, weak intensity, moderate HCI reaction	82.81	15.77	1.40	0.180	0.140	237	52	50
Section 20	<u>)15-09 (U</u>	TM 603690E,	<u>, 5763688N)</u>								
126932	Mpk	2.75	<b>Dolomitic Lime Wackestone</b> , light grey weathered, medium brown-grey fresh, micritic to coarse-grained, fossils: crinoid stem, rare; crinoid ossicle, rare; brachiopod, rare, thickly-bedded to massively-bedded, resistant, moderate, vuggy (calcite-filled), weak HCl reaction	90.13	8.60	0.82	0.150	0.220	246	86	607
126933	Mpk	2.5	Lime Grainstone, light grey weathered, medium brown-grey fresh, coarse-grained to very coarse-grained, fossils: crinoid stem, abundant; crinoid ossicle, abundant; brachiopod, rare, moderately-bedded to massively-bedded, resistant, soft, sucrosic, vuggy (open), alteration: oxide, localized, weak intensity, strong HCI reaction	97.63	2.24	0.22	0.070	0.110	238	49	50
126934	Mpk	2.5	<b>Dolomitic Lime Grainstone,</b> light grey weathered, medium grey to dark grey fresh, coarse-grained to very coarse-grained, fossils: crinoid stem, abundant; crinoid ossicle, abundant; brachiopod, rare, massive, resistant, moderate, sucrosic, vuggy (open), moderate HCI reaction	93. <b>7</b> 0	6.09	0.30	0.070	0.200	214	65	50
126935	Mpk	1.5	Strongly Dolomitic Lime Wackestone, light grey weathered, medium grey fresh, cryptocrystalline to coarse-grained, fossils: crinoid ossicle, rare; brachiopod, rare, thickly-bedded, resistant, moderate, vuggy (calcite-filled), moderate HCI reaction	81.90	17.40	0.50	0.090	0.150	160	64	50
Section 20	015-10 (U	TM 603673E	<u>, 5763710N)</u>								
126936	Mpk	2.25	Lime Grainstone, light grey weathered, medium grey fresh, coarse-grained to very coarse-grained, fossils: solitary rugose coral, rare; crinoid stem, abundant; crinoid ossicle, abundant, thickly-bedded to massively-bedded, slightly resistant, moderate, homogeneous, sucrosic, strong HCI reaction	98.88	1.11	0.22	0.060	0.070	263	31	50
126937	Mpk	3.5	Lime Grainstone, light grey weathered, medium grey fresh, coarse-grained to very coarse-grained, fossils: solitary rugose coral, rare; crinoid stem, abundant; crinoid ossicle, abundant, thickly-bedded to massively-bedded, slightly resistant, moderate, sucrosic, homogeneous, strong HCI reaction	98.34	1.05	0.37	0.070	0.100	300	37	50
126938	Mpk	3.5	Strongly Dolomitic Lime Packstone, light grey weathered, medium grey to dark grey fresh, micritic to coarse-grained, fossils: solitary rugose coral, rare, thickly-bedded, slightly resistant, moderate, vuggy (calcite-filled), moderate HCI reaction	79.01	19.46	1.17	0.180	0.190	231	61	276
126939	Mpk	4.75	Strongly Dolomitic Lime Mudstone, light grey weathered, medium brown-grey fresh, cryptocrystalline to micritic, thickly-bedded, recessive, moderate, vuggy (calcite-filled), alteration: oxide, localized, very weak intensity, moderate HCI reaction, structure(s): fracture, outcrop-scale, weak; bedding (definite), outcrop-scale, 160/18 SW	84.06	13.37	1.95	0.200	0.140	266	43	50

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Sample	Strat Unit	Strat Tkns (m)	Description	CaCO ₃ (%)	MgCO₃ (%)	SiO₂ (%)	Al ₂ O3 (%)			MnO (ppm)	P₂O₅ (ppm)
<u>Section 20</u> 126940	9 <b>15-11 (UT</b> Mpk	<u>M 607789E,</u> 1.5	5755514N) Strongly Dolomitic Lime Wackestone, light grey weathered, medium brown-grey fresh, cryptocrystalline to medium-grained, fcssils: solitary rugose coral, rare, thinly-bedded to moderately-bedded, slightly resistant, moderate, alteration: oxide, localized, weak intensity, moderate HCl reaction, structure(s): calcite veinlet, outcrop-scale, weak	76.39	22.95	0.52	0.110	0.230	210	53	50
126941	Mpk	4.25	Strongly Dolomitic Lime Mudstone to Strongly Dolomitic Lime Wackestone, light grey weathered, medium grey to dark grey fresh, micritic to coarse-grained, fossils: solitary rugose coral, rare; crinoid stem, rare; crinoid ossicle, rare, moderately-bedded, slightly resistant, hard, vuggy (open), moderate HCI reaction	80.85	17.95	0.89	0.170	0.140	212	45	50
126942	Mpk	2.75	<u>Strongly Dolomitic Lime Mudstone</u> , light grey weathered, medium grey to dark grey fresh, cryptocrystalline to micritic, thinly-bedded, slightly resistant, soft, vuggy (calcite-filled), alteration: oxide, localized, weak intensity, moderate HCI reaction, structure(s): fracture, outcrop-scale, moderate; bedding (definite), outcrop-scale, 59/4 SE	83.71	12.28	2.61	0.330	0.160	244	52	50
126943	Mpk	3.75	Lime Mudstone, light grey weathered, very-dark grey fresh, cryptocrystalline to micritic, thinly-bedded, slightly resistant, moderate, vuggy (calcite-filled), alteration: oxide, localized, very weak intensity, moderate HCl reaction, structure(s): quartz veinlet, outcrop-scale, weak; fracture, outcrop-scale, moderate	95.31	2.30	1.36	0.200	0.150	272	45	50
126944	Mpk	3.5	Lime Mudstone, light grey weathered, dark brown-grey fresh, cryptocrystalline to micritic, fossils: crinoid ossicle, rare, thinly-bedded to moderately-bedded, recessive, soft, vuggy (calcite-filled), moderate HCI reaction, structure(s): fracture, outcrop-scale, moderate; calcite veinlet, outcrop-scale, moderate	96.73	1.34	0.85	0.140	0.150	303	36	50
126945	Mpk	0.75	Lime Mudstone, light grey weathered, dark brown-grey fresh, cryptocrystalline to micritic, fossils: crinoid ossicle, very rare, thinly-bedded to moderately-bedded, slightly resistant, soft, vuggy (calcite-filled), moderate HCI reaction, structure(s): fracture, outcrop-scale, moderate; calcite veinlet, outcrop-scale, moderate; bedding (definite), outcrop-scale, 21/9 SE	96.38	2.05	0.63	0.120	0.100	274	36	50
126946	Mpk	0.75	<b>Strongly Dolomitic Lime Mudstone</b> , light grey weathered, medium brown-grey to dark brown-grey fresh, cryptocrystalline to micritic, recessive, soft, vuggy (calcite-filled), vuggy (open), alteration: oxide, localized, moderate intensity, moderate HCI reaction	80.31	15.58	2.93	0.360	0.220	533	81	50
126947	Mpk	1	<b>Dolomitic Mudstone</b> , light grey weathered and fresh, micritic, recessive, soft, vuggy (calcite-filled), pockety, moderate HCI reaction, structure(s): calcite veinlet, outcrop-scale, moderate	55.33	42.90	1.23	0.100	0.160	115	73	139
Section 20	)15-12 (UT	<u>M 607809E,</u>	<u>5755421N)</u>								
126948	Mpk	2.25	Lime Grainstone, medium grey weathered, medium grey to dark grey fresh, medium-grained to coarse-grained, fossils: solitary rugose coral, rare; fragment (indeterminate), common; crinoid stem, abundant; crinoid ossicle, abundant; brachiopod, rare, thickly-bedded to massively-bedded, resistant, hard, vuggy (calcite-filled), vuggy (open), moderate HCI reaction	98.52	0.69	0.56	0.050	0.090	281	63	50
126949	Mpk	3.5	Lime Grainstone, medium grey weathered, medium grey to dark grey fresh, medium-grained to coarse-grained, fossils: solitary rugose coral, rare; fragment (indeterminate), common; crinoid stem, abundant; crinoid ossicle, abundant; brachiopod, rare, thickly-bedded to massively-bedded, resistant, hard, vuggy (calcite-filled), nodular, vuggy (open), alteration: oxide, localized, moderate intensity, strong HCI reaction	97.63	0.69	0.84	0.100	0.110	306	48	50

Sample	Strat Unit	Strat Tkns (m)	Description	CaCO ₃ (%)	MgCO₃ (%)	SiO₂ (%)	Al₂O₃ (%)			MnO (ppm)	P₂O₅ (ppm)
126950	Mpk	3.5	Lime Wackestone to Lime Grainstone, medium grey weathered, medium grey to dark grey fresh, micritic to coarse-grained, fossils: solitary rugose coral, rare; crinoid stem, common; crinoid ossicle, common; colonial coral, rare, thickly-bedded to massively-bedded, resistant, vuggy (calcite-filled), moderate HCI reaction, structure(s): contact (sharp), local-scale, weak	98.52	0.63	0.43	0.070	0.110	230	56	50
126951	Msh	2.75	<b>Dolomitic Lime Mudstone</b> , medium brown-grey weathered, medium brown-grey to dark brown-grey fresh, micritic, thickly-bedded to massively-bedded, resistant, vuggy (calcite-filled), cherty, alteration: oxide, localized, moderate intensity, weak HCl reaction, structure(s): calcite veinlet, outcrop-scale, weak	98.16	0.94	0.28	0.060	0.120	193	73	50
Section 20	<u>015-13 (U</u>	<u>FM 608140E</u>	<u>, 5755219N)</u>								
126965	Mpk	1.5	Lime Grainstone, light grey to very-light grey weathered, medium grey fresh, coarse-grained to very coarse-grained, fossils: crinoid stem, very abundant; crinoid ossicle, very abundant, thinly-bedded to moderately-bedded, resistant, hard, moderate HCI reaction, structure(s): contact (sharp), outcrop-scale, strong, 119/19 SW; bedding (definite), outcrop-scale, moderate, 119/19 SW	98.16	0.88	0.42	0.060	0.140	280	40	50
126966	Mpk	3	<b>Dolomitic Lime Grainstone</b> , light grey weathered, medium grey fresh, coarse-grained to very coarse-grained, fossils: fragment (indeterminate), rare; crinoid stem, very abundant; crinoid ossicle, very abundant; brachiopod, rare, thinly-bedded to moderately-bedded, resistant, blocky, strong HCI reaction, structure(s): fracture, outcrop-scale, moderate	94.41	5.38	0.30	0.090	0.100	242	42	50
126967	Mpk	2.5	Slightly Dolomitic Lime Grainstone, light grey weathered, medium grey fresh, coarse-grained to very coarse-grained, fossils: fragment (indeterminate), rare; crinoid stem, very abundant; crinoid ossicle, very abundant; brachiopod, rare, thinly-bedded to moderately-bedded, resistant, blocky, vuggy (open), alteration: oxide, localized, weak intensity, moderate HCI reaction	95.66	3.62	0.36	0.070	0.100	255	39	50
126968	Mpk	2	Dolomitic Lime Packstone, light grey weathered, medium grey fresh, micritic to very coarse-grained, fossils: solitary rugose coral, rare; crinoid stem, abundant; crinoid ossicle, abundant, thinly-bedded, resistant, hard, blocky, vuggy (open), strong HCI reaction	91.38	7.20	0.61	0.090	0.100	282	39	50
126969	Mpk	2.75	Strongly Dolomitic Lime Grainstone, light grey weathered, medium grey to light grey fresh, coarse-grained to very coarse-grained, fossils: solitary rugose coral, rare; crinoid stem, very abundant; crinoid ossicle, very abundant, thinly-bedded to moderately-bedded, resistant, strong HCI reaction, structure(s): joint, outcrop-scale, strong; fracture, outcrop-scale, strong	86.20	12.49	0.56	0.140	0.190	269	31	119
126970	Mpk	2.5	Strongly Dolomitic Lime Packstone, light grey weathered, medium grey to light grey fresh, micritic to very coarse-grained, fossils: solitary rugose coral, rare; crinoid stem, abundant; crinoid ossicle, abundant; brachiopod, common, thinly-bedded, resistant, blocky, strong HCI reaction	87.81	11.17	0.62	0.120	0.130	297	42	50
126971	Mpk	2.5	Lime Packstone, light grey weathered, medium grey fresh, micritic to very coarse-grained, fossils: solitary rugose coral, rare; crinoid stem, abundant; crinoid ossicle, abundant; brachiopod, common, thinly-bedded, resistant, hard, blocky, vuggy (open), strong HCI reaction, structure(s): calcite vain let, outcrop-scale, moderate	94.77	1.17	3.41	0.080	0.090	362	26	50
126972	Mpk	2.5	Slightly Dolomitic Lime Packstone, light grey weathered, medium grey fresh, micritic to very coarse-grained, fossils: solitary rugose coral, rare; crinoid stem, abundant; crinoid ossicle, abundant; brachiopod, common, thinly-bedded, resistant, hard, cherty, blocky, vuggy (open), moderate HCI reaction, structure(s): calcite veinlet, outcrop-scale, moderate	96.56	2.43	0.33	0.070	0.110	359	33	50

Sample	Strat Unit	Strat Tkns (m)	Description	CaCO ₃ (%)	MgCO₃ (%)	SiO₂ (%)	Al ₂ O3 (%)		SrO (ppm)	MnO (ppm)	P2Os (ppm)
126973	Mpk	2	<u>Slightly Dolomitic Lime Grainstone</u> , light grey to very-light grey weathered, medium grey fresh, coarse-grained to very coarse-grained, fossils: fragment (indeterminate), rare; crinoid stem, very abundant; crinoid ossicle, very abundant, thinly-bedded to moderately-bedded, slightly resistant, hard, strong HCI reaction, structure(s): calcite veinlet, outcrop-scale, moderate	96.02	2.95	0.27	0.060	0.120	361	36	50
126974	Mpk	2.75	<u>Calcareous Dolomitic Mudstone</u> , tan to very-light grey weathered, dark brown-grey to medium brown-grey fresh, micritic, fossils: solitary rugose coral, rare, moderately-bedded, resistant, hard, vuggy (open), weak HCI reaction, structure(s): calcite vein, outcrop-scale, weak	63.54	27.53	6.73	0.160	0.130	207	62	411
126975	Mpk	1.5	Strongly Dolomitic Lime Mudstone to Dolomitic Bindstone, tan weathered, medium grey fresh, micritic, fossils: peloid, common; algal mat, abundant, thinly-bedded, slightly resistant, hard, stromatolitic, weak HCI reaction	78.17	20.56	0.61	0.130	0.140	229	52	50
126976	Mpk	2.75	Strongly Dolomitic Lime Mudstone to Dolomitic Bindstone, tan to light grey weathered, medium grey to dark grey fresh, cryptocrystalline to micritic, fossils: solitary rugose coral, rare; peloid, rare; algal mat, abundant, thinly-bedded to moderately-bedded, resistant, hard, stromatolitic, vuggy (calcite-filled), alteration: oxide, localized, weak intensity, weak HCl reaction, structure(s): calcite vein, outcrop-scale, strong	89.95	9.41	0.44	0.110	0.200	273	43	50
126977	Mpk	2.5	Slightly Dolomitic Lime Mudstone to Lime Bindstone, light grey to medium grey weathered, medium brown-grey fresh, cryptocrystalline to micritic, fossils: algal mat, common, thinly-bedded to moderately-bedded, resistant, hard, stromatolitic, vuggy (calcite-filled), vuggy (open), moderate HCI reaction, structure(s): calcite veinlet, outcrop-scale, moderate	94.77	3.01	1.02	0.160	0.160	328	47	50
126978	Mpk	0.75	<b>Dolomitic Lime Mudstone to Lime Bindstone</b> , light grey weathered, dark grey fresh, cryptocrystalline to medium-grained, fossils: peloid, rare; ooid, rare; crinoid ossicle, rare, thinly-bedded to moderately-bedded, recessive, hard, moderate HCI reaction, structure(s): calcite veinlet, outcrop-scale, weak	90.67	7.24	1.25	0.180	0.210	229	65	50
126979	Mpk	1.5	Lime Mudstone to Lime Bindstone, light grey weathered, dark brown-grey to medium brown-grey fresh, cryptocrystalline to micritic, fossils: algal mat, common, thinly-bedded to moderately-bedded, recessive, hard, stromatolitic, strong HCI reaction, structure(s): calcite veinlet, outcrop-scale, weak	96.91	2.15	0.36	0.080	0.100	273	35	50
126980	Mpk	1.5	Slightly Dolomitic Lime Mudstone to Lime Bindstone, light grey to medium grey weathered, medium brown-grey to dark brown-grey fresh, cryptocrystalline to medium-grained, fossils: ooid, rare; crinoid stem, rare; crinoid ossicle, rare; algal mat, common, thinly-bedded to moderately-bedded, recessive, hard, stromatolitic, vuggy (calcite-filled), alteration: oxide, localized, weak intensity, moderate HCI reaction, structure(s): calcite veinlet, outcrop-scale, weak	94.41	3.62	1.11	0.160	0.100	290	33	50
126981	Mpk	3.5	Lime Mudstone, light grey to very-light grey weathered, medium brown-grey to dark brown-grey fresh, cryptocrystalline to micritic, thinly-bedded to moderately-bedded, slightly resistant, hard, moderate HCl reaction, structure(s): calcite veinlet, outcrop-scale, weak; bedding (undulatory), outcrop-scale, 20/20 E	97.63	1.30	0.52	0.110	0.100	308	41	50
	0 <u>15-14 (U</u>	TM 607942E	<u>, 5759763N)</u>								
127005	Mpk	3	Slightly Dolomitic Lime Grainstone, light grey to tan weathered, medium grey to dark grey fresh, coarse-grained to very coarse-grained, fossils: solitary rugose coral, rare; crinoid stem, very abundant; crinoid ossicle, very abundant, massive, resistant, vuggy (calcite-filled), alteration: oxide, localized, very weak intensity, moderate HCI reaction, structure(s): fracture, outcrop-scale, weak	95.31	3.45	0.60	0.140	0.120	345	38	50

Sample	Strat Unit	Strat Tkns (m)	Description	CaCO ₃ (%)	MgCO₃ (%)	SiO₂ (%)	Al ₂ O3 (%)	Fe ₂ O ₃ (%)	SrO (ppm)	MnO (ppm)	P₂O₅ (ppm)
127006	Mpk	3.75	Lime Grainstone, light grey to medium grey weathered, medium grey to light grey fresh, medium-grained to coarse-grained, fossils: solitary rugose coral, rare; crinoid stem, very abundant; crinoid ossicle, very abundant, massive, resistant, hard, alteration: oxide, localized, weak intensity, weak fetid odour, moderate HCl reaction, structure(s): joint, outcrop-scale, moderate; fracture, outcrop-scale, moderate	97.81	1.05	0.40	0.100	0.120	351	35	50
127007	Mpk	3.25	Lime Grainstone, light grey to medium grey weathered, medium grey fresh, medium-grained to coarse-grained, fossils: solitary rugose coral; crinoid stem; crinoid ossicle, massive, resistant, moderate, alteration: oxide, localized, weak intensity, weak fetid odour, strong HCI reaction, structure(s): calcite veinlet, outcrop-scale, weak	97.98	1.26	0.28	0.060	0.060	376	21	50
127008	Mpk	4.5	Lime Packstone to Lime Grainstone, light grey to medium grey weathered, dark grey fresh, micritic to coarse-grained, fossils: solitary rugose coral, rare; crinoid stem, common; crinoid ossicle, abundant, thickly-bedded to massively-bedded, moderate, strong HCl reaction, structure(s): calcite veinlet, outcrop-scale, weak; bedding (definite), outcrop-scale, 74/10 SE	98.34	1.05	0.25	0.060	0.080	415	26	50
127009	Mpk	3	Dolomitic Lime Mudstone to Dolomitic Lime Wackestone, light grey weathered, medium grey to dark grey fresh, micritic to coarse-grained, fossils: crinoid stem, rare; crinoid ossicle, rare; brachiopod, common, moderately-bedded to thickly-bedded, resistant, vuggy (calcite-filled), strong HCI reaction, structure(s): bedding (approximate), outcrop-scale, 250/10 NW	88.52	8.51	1.75	0.280	0.140	280	45	50
127010	Mpk	2.5	Lime Mudstone to Lime Wackestone, light grey weathered, medium brown-grey to dark brown-grey fresh, cryptocrystalline to medium-grained, fossils: crinoid stem, very rare; crinoid ossicle, rare; brachiopod, rare, moderately-bedded to thickly-bedded, resistant, vuggy (calcite-filled), vuggy (open), strong HCI reaction, structure(s): calcite veinlet, outcrop-scale, moderate	97.27	1.34	0.49	0.110	0.080	331	38	50
127011	Mpk	3	Lime Mudstone to Lime Wackestone, light grey weathered, dark grey fresh, micritic to medium-grained, fossils: crinoid stem, rare; crinoid ossicle, rare; brachiopod, rare, thickly-bedded, resistant, vuggy (calcite-filled), vuggy (open), moderate HCI reaction, structure(s): calcite veinlet, outcrop-scale, weak	97.45	1.15	0.67	0.130	0.070	331	27	50

# APPENDIX 3: ANALYTICAL LABORATORY INFORMATION AND TECHNIQUES

# Name and Address of the Lab:

Graymont Western US Inc., Central Laboratory. 670 East 3900 South, Suite 205 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 HCI; a total of 40 mL 1:1 HCI 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.

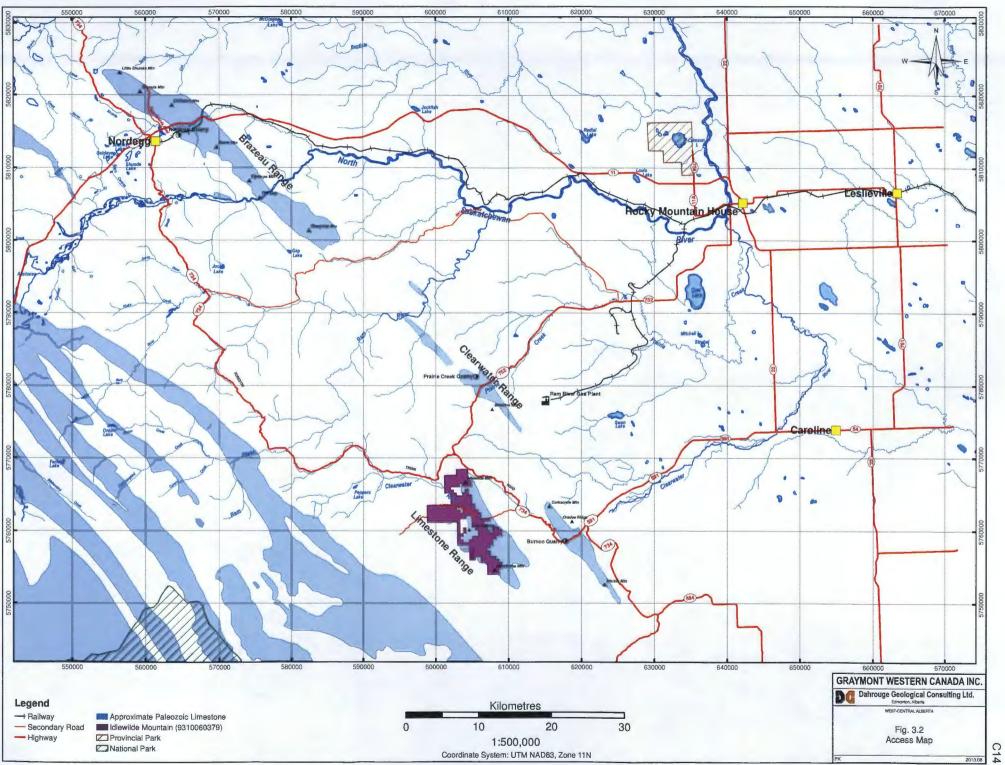
#### Mesh Size Fraction, Split and Weight of Sample:

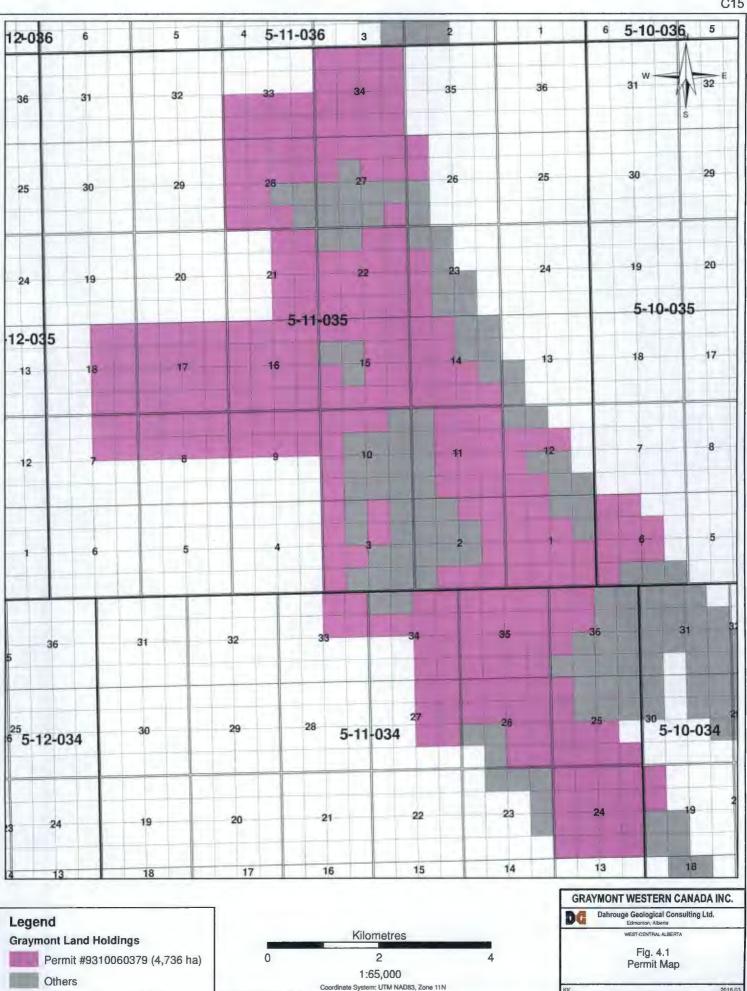
Upon receiving the samples, the prep room technician riffles and then splits the stone down to a manageable size (roughly 200 g). The stone is then dried in an oven at 120°C. Once the samples have been dried they get pulverized to a -200 mesh size. A split of this pulverized material is then sent for 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 12th 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.







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