



KENNECOTT CANADA EXPLORATION
INC. LEGEND JV DIAMOND DRILL LOGS



Drill Hole:	98DH-RO01	Azimuth:	N/A
Easting:	365 051 m E (NAD 27)	Dip:	-90°
Northing:	6 357 585 m N (Z 12)	Depth (EOH):	177.1 m (EOH)
Collar Elevation:	~ 687.5 m amsl (Map)	Diameter(s):	NQ
Grid Location:	950 E, 5250 N	Geologist:	Ian Graham
Drill Contractor:	Aggressive Drilling	Geotech/Sampler:	Richard Beck
Contracted to:	Kennecott Canada	Project Geologist:	Theo Aravanis
Drill Type:	Boyles 25A	Date Collared:	6 October, 1998
Drill Foreman:	Mitch McLellan	Date Completed:	12 October, 1998

Summary Information

Drill-hole 98DH-RO01 is the first hole drilled on the Kennecott / Montello Resources Legend Joint Venture target LGD02 (Roc) in the Birch Mountains area, northeast Alberta. The hole is sited to test an airborne geophysical target (positive magnetic feature) recognized as a potential kimberlite. The hole has intersected kimberlite intercalated in Cretaceous? sediments beneath ~ 85m of till sediment cover, and constitutes the discovery hole for the Roc Kimberlite. It is anticipated that an intact 'pipe' of kimberlite exists proximal to the kimberlite intersected in this hole, which is thought to be marginal to such an occurrence.

NQ core recovered volcanoclastic kimberlite fragments and xenoliths as deformed re-sedimented / injected intervals in a soft mud dominated sedimentary pile. The core has been split: half core has been sampled for detection of diamonds (by caustic fusion at Kennecott's micro-diamond facility in Thunder Bay, ON.) Samples have also been taken for indicator HM recovery / EPMA mineral chemistry, petrographic examination, geochronology and palynology (refer end of log). Visual logging has not identified any P or E type indicator minerals / xenoliths (except relict olivine). Magnetism is thought to be a result of locally prolific serpentine + magnetite alteration of the olivine observed in kimberlitic materials: the serpentine is subsequently carbonatised.

PVC pipe inserted in hole to ~ 152.4 m (50 lengths). Casing was removed, though with some difficulty.

Summary Log

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Detailed Log**0.0 - 85.7 m****Cased Overburden**

Drillers indicate boulder tills common throughout tri-cone drilling to set casing. Sandy seams are common through the deeper segment of the till interval.

85.7 - 120.4 m**Stiff Black Clay and Fine to Medium Grained Unconsolidated Sands**

Black stiff to very stiff and generally massive to locally laminated clays and unconsolidated, generally mature sand seams. The clays are devoid of polymict till style lithic clasts (though 'autolithic' clay fragments and some kimberlitic clasts are observed), and are therefore presently inferred to be of pre-Pleistocene (Upper Cretaceous?) age.

85.7 - 88.2 m	Grey - black, very stiff ¹ claystone of inferred pre-Pleistocene age. Rare decompression type de-lamination observed
88.2 - 89.9 m	Lighter grey - black sand - silt rich mud rock of stiff consistency
89.9 - 90.2 m	Black stiff mudstone
90.2 - 91.0 m	Sandy mud rocks, unlithified sands (washed) and up to 40% lost core
91.0 - 91.4 m	Stiff black mud rock dominated intersection
91.0 - 102.3 m	Unlithified light grey -brown sand and minor silt dominated interval, < 10% intact recovery. Sand component is sub rounded to rounded fine grained Qz (clear and pinkish coloured) with rare small feldspars and some opaque oxides. No glauconite recognised, minor clay 'flecks' in the matrix (introduced during drilling?)
102.3 - 105.5 m	Interval recovery < 1%, mostly lithic cobbles / gravel of vein Qz pebbles, quartzite, f.g. diabase and sandstone

105.5 - 119.5 m**Tri-coning**

Coring replaced by tri-cone development (casing extended): cobbles boxed.

¹ As per Clay Geotechnical Gauge, W.F.McCulloch, 3101 Elkridge Crt, Beltsville, MD, 20705, USA

119.5 -120.4 m**Unconsolidated Sands**

Mature rounded to sub-rounded medium grained to fine grained quartz sands. The interval is unlithified, with only slight lithification evident.

120.4 - 134.2 m**Stiff Black (-Grey) Kimberlitic Claystone and Claystone Breccia**

Black to grey-black Cretaceous? Mudstone of stiff to very stiff consistency with variable amounts of generally matrix supported kimberlitic clasts (both lithic and [mega]crystic). Locally, kimberlitic (and other xenolithic) fragments > 10mm are abundant and > 15% in the rocks. Where > 15%² of fragments are kimberlitic, the rock is termed a kimberlitic breccia. Where the coarse fragments exceed 15%, with < 15% being kimberlitic, the rock is termed a breccia. Where > 50% of the rock comprises of lithic or megacrystic kimberlite clasts, the terms kimberlite breccia or kimberlite are applied (without regard for the inferred mechanisms of rock formation / emplacement). The clay matrices of the various subunits are invariably reactive to acid (HCl). This indicates a ubiquitous presence of micritic? calcite. Carbonate replacement of olivine in intact kimberlite fragments / autoliths is frequently complete.

120.4 - 122.6 m	Sand-sized fragment-bearing mud rock, with up to 10% fragments locally
122.6 - 123.5 m	Kimberlitic mud rock breccia containing 3 - 5cm kimberlite fragments. The rock matrix is mud.
123.5 - 124.2 m	Coarse sand sized kimberlite fragment bearing mud rock
123.8 m	Intact 4cm rounded kimberlite fragment
124.2 - 126.5 m	Mud fragment to locally kimberlitic (10 cm intervals) mud rock breccia
126.5 - 128.5 m	Kimberlitic breccia with local sand-size kimberlite fragment rich units
128.5 - 130.2 m	Abundant lithic and kimberlitic clastic fragments in a kimberlitic mud rock breccia
130.2 - 131.8 m	Intermittent mud rock to gritty lithic mud rock breccia. The grit-sized lithic fragments are matrix supported and some mud clasts appear to be 'rip-up' type autoclasts. Rounded vein-type Qz is observed among the clasts, and kimberlitic clasts include some CRX-cored types
131.8 - 132.9 m	A kimberlitic mud rock breccia with abundant grit sized clasts

² by rapid visual estimate

- 132.9 - 134.2 m A kimberlitic mud rock breccia with abundant large a locally close-packed fragments - elongate clasts show some tendency to be flat lying (~ 90° to core axis)
- 133.9 m A large 10cm competent, macrocrystic kimberlite clast. The kimberlite appears to be volcanoclastic, with olivine relics displaying complete carbonate replacement

134.2 - 174.0 m**Carbonatised, Mud-rich Kimberlite**

These rocks appear as slightly lighter grey-black, highly competent 'kimberlite', locally broken (disrupted) with stiff (or softer) mud infill between fractures. Locally, kimberlite fragments are somewhat rounded.

The intact 'kimberlite' appears to comprise kimberlitic fragments, olivine and other macrocrysts and lithic country rock clasts in an aphanitic dark grey matrix (in which micritic carbonate is ubiquitous).

Though generally medium to finer grained, the matrix held (probable) olivine relics suggest a variation in packing density suggestive of a volcanoclastic deposition. The units also commonly include rounded kimberlite autoliths 'lapilli'.

These rocks may represent a large lithic interval of (mega clast or pipe marginal soft sediment deformationally introduced) carbonatised kimberlite in which mud fragments and disaggregated muds are included.

Dark carbonate / clay shell casts and impressions are also noted (e.g. 235.4 m).

- 134.2 - 135.0 m Mud-cemented broken "kimberlite" zone with soft mud in the fractures: locally zones are fractured and fragmented to grit sized pieces
- 135.0 -135.6 m Competent 'kimberlite' zone, mud clasts suggest zoned alteration in some cases; shell cast recognized at 135.4 m
- 135.6 - 137.1 m Mud-cemented³ broken "kimberlite" zone with soft mud in the fractures: locally zones are fractured and fragmented to grit sized pieces
- 137.1 - 137.5 m Mud-rich seams and lesser, short intervals of competent kimberlite fragment intervals

³ The interfragmental, stiff (or softer) mud cement is invariably carbonatised

137.5 - 138.1 m	Mud cemented broken kimberlite zones, with soft mud seams and fracture in-fills
138.1 - 138.9 m	Competent kimberlite breccia zone with soft mud seams and fracture in-fills
138.1 - 138.9 m	Competent kimberlite breccia zone with abundant sub-angular and plastically deformed mud clasts. Carbonate replacement of a mud - kimberlite (serpentine / calcite / Mg-smectite) matrix is inferred
138.9 - 139.4 m	Alternating mud seams and mud-cemented fractured kimberlite
139.4 - 139.8 m	Competent carbonatised kimberlite zone (refer 138.1 - 138.9m)
139.8 - 143.7 m	Alternating, extensive kimberlitic mud rock breccia zones (with stiff to locally softer clay), accompanied by lesser (5 - 20 cm) broken kimberlite to kimberlite breccia intervals (characterized by abundant mud clasts and inter-fragmental mud). Minor mud seams characterise some breaks).
143.7 - 144.8 m	Moderately competent, very stiff carbonatised kimberlitic mud rock. Most clasts are m.g. - c.g. with lithic fragments
144.8 - 147.8 m	Soft, moderately carbonatised kimberlitic mud rock with local variation in grit sized kimberlitic fragments to include numerous zones of < 15% kimberlitic fragments; drill erosion evident in soft mud-rich zones of core
147.8 - 149.7 m	Dark grey - black mud bearing kimberlite zone with abundant kimberlite crystic relics and altered sub-rounded kimberlite fragments. Mud fragments are typically small and rounded. The matrix appears almost entirely carbonate replaced, and smaller fragments are typically plucked from the core. Mud seams occur in fractures below 148.9 m
149.7 - 150.7 m	Mud-cemented broken zone with mud-filled fractures
150.7 - 155.8 m	Coarser fragment bearing, moderately competent mud-rich kimberlite breccia (to locally kimberlite) interval with zones of white visibly coarser carbonatisation. Areas of abundant fragments (and coarser carbonate) include most of the 152.7 - 154.0 m interval. The unit grades downward into a similar but more competent unit.
155.8 - 157.3 m	Competent dark grey mud bearing kimberlite breccia, with locally abundant light coloured olivine relics, grading back into a softer, darker kimberlite breccia unit
157.3 - 159.9 m	Grey - black, mud rich kimberlite breccia to less fragmental kimberlite with mud seams at 157.4 and 159.1 m. Relict olivines are ubiquitous in kimberlite fragments ('autoliths') and are in similar abundance in the matrix, suggesting that

	primary kimberlite substantially exceeded the mud component pre-carbonatisation
159.9 - 164.4 m	Zone of mud matrix cemented box of disrupted, non-breccia kimberlite: carbonatisation affects both the kimberlite and the inter-fragmental matrix. Below 161.2 m, minor mud dominated zones and mud seams occur, especially at 162.0, 162.6 and 164.0 m
164.2 - 166.4 m	Mud rock zone, with traces of kimberlitic material and fragments. This claystone intersection is stiff to very stiff, with some extensive drill abrasion on core in places
166.4 -174.0 m	Dark grey to black mud rich kimberlite (to locally kimberlite breccia), generally competent with mud seams and mud dominated (kimberlitic mud rock) zones (e.g. 167.9 - 168.1 m, 168.8 - 169.2 m and 171.0 - 171.3 m).

174.0 - 177.1 m**Mudstone and Sand**

174.0 - 174.7 m	Grey - black mudstone of variable consistency. There is a downward increase in mature sand and grit seen embedded in the mud core (these sands embedded during drilling), with very few kimberlitic fragments (in the upper part of the interval only).
174.7 - 177.1 m	Grey - black mudstone / mud fragment breccia intersection. Texturally similar to the broken kimberlitic mud rock zones, only traces of kimberlite are present. A fine grained mud rock, with only very minor 'kimberlitic' material - this unit has been split but is not expected to yield indicators.
177.1 m	From this marker, about 30cm of unconsolidated mature sand has been boxed. This sand incursion into the tube occurred with slight pullback to free the rods, and has affected the lower several meters of the hole. Upon completion of the hole, sand appears to have filled the hole from bottom (at least 10m!). When the unconsolidated sands were intersected, geologist could not visit the rig owing to weather. The satellite phone report of 'flowing sand' suggested that Cretaceous strata were being drilled, and the hole was terminated.

177.1m**E.O.H.**

Representative ('Rep') Samples

#	Depth in Hole	Geological Unit	Depth in Hole	Geological Unit
1	124.5	Kimberlitic Claystone & Bx	157.9	Carbonatised, Mud-rich Kimberlite
2	133.3	Kimberlitic Claystone & Bx	160.3	Carbonatised, Mud-rich Kimberlite
3	143.5	Carbonatised, Mud-rich Kimberlite	164.5	Carbonatised, Mud-rich Kimberlite
4	147.7	Carbonatised, Mud-rich Kimberlite		
5	155.8	Carbonatised, Mud-rich Kimberlite		

Heavy Mineral / Micro-diamond Sample list

Sample No.	From (m)	To (m)	Interval (m)	Mass (kg)	Shipped
VR87843A	Composite	Sample	-	12.5	20 October, 1998
VR87844A	120.7	126.1	5.4	10	20 October, 1998
VR87845A	126.1	132	5.9	10	20 October, 1998
VR87846A	132	138.8	6.8	10	20 October, 1998
VR87847A	138.8	145.5	6.7	10	20 October, 1998
VR87848A	145.5	152	6.5	10	20 October, 1998
VR87849A	152	158.8	6.8	10	20 October, 1998
VR87850A	158.8	166.2	7.4	10	20 October, 1998
VR87851A	166.2	171.8	5.6	10	20 October, 1998
VR87852A	171.8	177.4	5.6	10	20 October, 1998
VR87878A	120.7	132	11.3	10	19 November, 1998
VR87879A	132	145.5	13.5	10	19 November, 1998
VR87880A	145.5	158.8	13.3	10.5	19 November, 1998
VR87881A	158.8	177.1	18.3	14	19 November, 1998

Shipped by KCEI Consignment No. B 0507, B 0510 Notable

Mantle Nodules

No mantle nodules or their xenocrysts were recognised during logging. A composite sample for indicator mineral chemistry has been submitted (VR 87843A).

Petrology Samples**Petrographic Samples**

Sample No.	Depth	Sampled by	Submitted to
No Samples			
Submitted			

Palynology Samples

Sample No.	Depth	Sampled by	Submitted to
VR31086A	116.9	Ian Graham Dolby Associates,	Calgary
VR31087A	201.1	Ian Graham Dolby Associates,	Calgary

Geochronology Samples

Sample No.	Depth	Sampled by	Submitted to
No Samples			
Submitted			