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Homestead Kimberlite 30 Tonne Mini-Bulk Sample 2007: Post Field Memo

Introduction

In November 2007 APEX Geoscience Ltd. (APEX) was retained by Delta Mining and Exploration (Delta) to evaluate the diamond potential of Delta's Homestead Kimberlite located near Grassrange, MT. APEX proposed the collection of an approximately 30 Tonne Mini Bulk sample from the kimberlite and subsequent processing for diamonds using a combination of Dense Media Separation (DMS) and Caustic Fusion processes at the Saskatchewan Research Councils (SRC) Geoanalytical Laboratories, Saskatoon, SK.

The Homestead Kimberlite

In the Grassrange region of central Montana approximately 30 igneous bodies are known which intrude basement rocks of the 2.6-3.2 Ga Wyoming Craton (Mitchell and Bergman, 1991). Two of these bodies are classified as bona-fide kimberlites (Homestead and Three Buttes). Both kimberlites occur within Delta's 7,554 acre Montana Properties. Kimberlites, lamproites and their mantle xenoliths are the only known sources of economic quantities of diamonds and are found in regions underlain by portions of cratons which are older than 2.4 Ga (Scott-Smith, 1995 and Dawson, 1970). Most diamonds form at depths of >150 Km under stable cratons, either as peridotites or eclogites and are transported to the surface as xenocrysts and xenoliths within kimberlite and lamproite magmas (Kirkley et al., 1991). The distribution of igneous rocks in the Grassrange area indicates a broad area of magma generation and ascent from the upper mantle. The potential for new kimberlite discoveries in the Grassrange area is considered high.

The Homestead kimberlite is classified as a phlogopite-monitcellite-diopside-calcite-serpentine kimberlite (Hearn, 2004). The kimberlite contains an unusually high proportion of peridotite mantle xenoliths up to 0.7 metre maximum dimension; some of the largest known in North America. The Homestead kimberlite represents a world-class mantle xenolith locality. The xenolith suite is dominated by dunite and harzburgite containing garnet, garnet and spinel or spinel only. An analysis of garnet xenocrysts from Homestead xenoliths reveals approximately 2% to 12% purple G10 low-calcium pyropes (Hearn, 2004). G10 garnets show a positive correlation with the presence of diamond in South African kimberlites (Gurney, 1984). In addition, approximately 10% of Cr-spinel (Chromite)

xenocrysts analysed by Hearn (2004) plot in the diamond inclusion field of Smith et al. (1994). Prior to sampling by APEX, one micro-diamond was recovered by caustic fusion of a 45 Kg sample of kimberlite (Ellsworth, 2000). The homestead kimberlite has the potential to host economic quantities of diamonds. It is recommended that a multi-tonne kimberlite mini-bulk sample be collected to evaluate this potential.

Mini Bulk Sampling

An APEX crew was mobilized to Montana on November 23, 2007. A total of 30,735 Kg of kimberlite, including 3,140 Kg of mantle xenoliths was collected between the dates of November 25 and November 29, 2007. Pickup and transport of the sample to the SRC occurred between the dates of December 3 and December 7, 2007. Subsamples were collected representing three generalized visually distinguishable lithologies at the Homestead Kimberlite: Green Mantle Xenolith Bearing Hypabyssal Kimberlite, Orange Lapilli Bearing Breccia and Mantle Xenoliths (Table 1).

Table 1: Homestead Mini Bulk Sample 2007 Weight Summary

Weight(Kg)	Lithology
5,095	Orange Breccia
22,500	Hypabyssal Kimberlite
3,140	Mantle Xenoliths
30,735	**TOTAL (Kg)**

The goal of the Mini-Bulk sampling during 2007 was to collect a sufficient quantity of kimberlite to make a preliminary evaluation of the diamond potential of the Homestead Kimberlite. The Homestead Kimberlite contains two dominant visually distinguishable kimberlite lithologies: Green mantle xenolith bearing hypabyssal kimberlite (HK) and Orange or light grey weathering lapilli bearing brecciated kimberlite (Breccia). Mantle xenoliths contained within the HK phase are dominated by dunites (approximately 78%) and harzburgites (approximately 22%) containing garnet, garnet and spinel or spinel only (Hearn, 2003). Subsamples of HK, Breccia and Mantle Xenoliths were collected.

The target weight of each subsample was determined by its inferred diamond potential. Diamonds are transported to the surface as mantle xenocrysts and xenoliths within the kimberlite. The HK phase, containing a high proportion of unusually large (up to 70 cm) potentially diamond bearing mantle xenoliths and more coherent macrocrystic kimberlite has the highest diamond potential. In contrast, the Breccia phase contains abundant limestone and shale crustal xenoliths both as large >1 metre rafts and finer centimetre scale fragments which downgrade its diamond potential. Due to their large size and relative proportion within the HK it was determined a third subsample of mantle xenoliths was warranted. With this in mind a target weight for each subsample was: 20 Tonnes of HK, 5 Tonnes of Breccia and 5 Tonnes of Mantle Xenoliths (30 Tonnes in total). In the case of mantle xenoliths, the size of the sample was limited to the amount that could be readily separated from the HK during excavation.

To facilitate collection of the Mini-bulk sample series of four small trenches / pits of approximately 4 metre by 4 metre dimension were excavated using a backhoe. Care was taken to remove all soil and weathered / disaggregated kimberlite from the surface before excavating undisturbed kimberlite outcrop. A single trench was excavated within brecciated kimberlite (Trench B, Figure 1). The remaining 3 trenches (Trenches A, C and D) were excavated within mantle xenolith bearing HK outcrops which were spatially distributed across the area of the Homestead Kimberlite in an attempt to provide a more representative sample of body. A total of 28 large polywoven ore bags, each weighing approximately 1,100 Kg, were collected from the 4 trenches (Table 2). After each bag was filled the top was closed and secured using uniquely numbered heavy duty steel cable security seals. Prior to excavation of the trenches mantle xenoliths lying on the surface were collected and placed in ore bags. Mantle xenoliths were also visually identified and separated by hand during excavation of the HK trenches. When all 28 bags were filled they were moved using a backhoe, pickup truck and trailer approximately 500 metres to Yellow Water Road in preparation for shipping. On December 4 and December 5, 2007 two shipments, each comprising 14 bags were loaded onto transport trailers. Once loaded the samples were covered and secured with heavy duty tarps and ratcheting webbing straps in preparation for shipping to the SRC, Saskatoon, SK. Both shipments are anticipated to arrive at the SRC by December 6, 2007, where they will be stored unopened in a secure facility prior to processing.

Geologic Notes

Excavating of the trenches provided a unique opportunity to learn more about the geology and mode of emplacement of the Homestead Kimberlite. A number of relevant observations made during trenching are presented below:

Trench B was excavated along the southern slope of a prominent cone shaped butte of orange brecciated lapilli bearing kimberlite. During excavation of Trench B a large shelf of dark grey shale was encountered towards the outer (downslope) part of the trench. Bedding within the shale was horizontal and appeared undisturbed. This may represent the remnants of a surrounding ring of Cretaceous shale (mapped by Ellsworth, 2000) that the kimberlite intrudes, or a large raft. An approximately 50 by 50 centimetre altered pale green HK autolith was also noted at the southern end of Trench B. HK outcrops 15 metres to the south in the “saddle” area and the autolith indicates some level of mixing between HK and Breccia phases.

Trench A was excavated in the saddle area. HK within Trench A is competent and can be described locally as a mantle xenolith and HK autolith bearing conglomerate cemented by dark grey to green macrocrystic HK. The kimberlite often breaks into large irregular blocks along the margins of xeno/auto-liths.

Further to the south two pits were excavated within 10 metres of Trench C. One of these trenches (not sampled due to dilution) consisted of an orange soft /weathered chaotic hybrid breccia containing angular clasts of HK up to 20 centimetres in size within a matrix of orange breccia. This further illustrates the complex relationship between HK and Breccia phases.

Table 2: Homestead Mini-Bulk Bag Weight Summary

Trench	Bag	Weight (Kg)	TOTAL (Kg)	Lithology
A	A1	940	6,920	Competent mantle xenolith bearing green hypabyssal kimberlite (**HK**)
	A2	990		
	A3	820		
	A4	850		
	A5	1080		
	A6	1100		
	A7	1140		
B	B1	1140	5,095	Orange or light grey weathering lappilli breccia (**BRECCIA**)
	B2	1055		
	B3	930		
	B4	1030		
	B5	940		
C	C1	1130	7,070	Soft micaceous mantle xenolith bearing green hypabyssal kimberlite (**HK**)
	C2	1240		
	C3	1230		
	C4	1210		
	C5	1160		
	C6	1100		
D	D1	1180	8,510	Competent or soft green micacous mantle xenolith bearing green hypabyssal kimberlite (**HK**)
	D2	1270		
	D3	1110		
	D4	1160		
	D5	1160		
	D6	1480		
	D7	1150		
A	X1	1100	3,140	Mantle Xenoliths (**MX**)
C	X2	1180		
C/D	X3	860		
4	**28**	**30,735**	**30,735**	**TOTAL (Kg)**

Trench C was excavated approximately 5 metres to the north closer to the saddle area and contained relatively undiluted soft / weathered mantle xenolith bearing HK. The largest of these xenoliths was discovered in the wall of Trench C. The xenolith was flattened and elliptical in shape with dimensions of approximately 0.7 x 0.3 x 0.2 metres and consisted of coarse clinopyroxene bearing harzburgite. Trench C and Trench A contained the largest number of mantle xenoliths, although small and large xenoliths were present within Trench D as well. Mantle xenoliths ranged in size from <10 centimetre to 70 centimetres in their longest dimension. Xenoliths typically had a flattened elliptical to disc-like or egg shape. A number of large tabular, 1 by 0.2 metre rafts of grey dolomite also occur within Trench C.

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