

Diamond Exploration in West Greenland – The Qaamasoq Prospect

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The Qaamasoq diamond prospect is situated within the West Greenland North Atlantic Craton (WG-NAC), approximately 130 km northeast of the Greenlandic capital, Nuuk. While all known occurrences of kimberlitic rocks in Greenland are dykes or sills, with occasional blows up to approximately 4 metres in width [1], examples of economic dykes of similar widths are known, for example the Snap Lake deposit in Canada. However, due to Qaamasoq's position high within the weathering profile of the WG-NAC, the potential for kimberlite pipes being preserved is greater in comparison to the more deeply eroded lower crustal levels of the craton. Previous exploration within the Qaamasoq licence area by a joint venture including Cominco Ltd. recovered a 0.28 x 0.28 x 0.21 mm clear, white macled diamond from a 34.6 kg kimberlite float sample [2]. NunaMinerals A/S began diamond exploration within the licence in 2010, flying a 2131 line-km helicopter-borne magnetic geophysical survey. Ground-truthing of resulting magnetic targets demonstrated that kimberlite float occurs abundantly at four localities, namely The Promontory, The Island, TMR-Q1-14 and Ullu. The abundance and size of mantle-derived kelyphitised pyrope garnet and the presence of eclogitic garnet within the kimberlites justified further evaluation. In addition the presence of large (>10cm) peridotite xenoliths also demonstrated a carrying capacity for large diamonds should they have been present within the source region. Hence bulk samples were collected for Diamond Indicator Mineral (DIM) separation and characterisation, and subsequently caustic fusion for microdiamond analysis (in partnership with Rio Tinto Exploration Ltd). DIM analysis revealed that the majority fall within well-established prospective fields, particularly the mineral chemistry of the peridotitic- and eclogitic-garnet suites, some falling in the G10(D) and G3(D) fields [3]. The 'D' suffix is applied to garnet-categories with strong compositional and P-T association with diamonds [3]. The DIM chemistry is similar to the Garnet Lake diamond deposit; 150 km to the north where the largest diamond from Greenland to date (2.4 ct) was recovered during reconnaissance sampling [4]. Of the three samples processed, totalling 150.4 kg, all were found to be diamondiferous, resulting in six diamonds with the largest stone recovered from the 212-micron sieve. The processing of small samples such as these encompasses significant statistical uncertainties with respect to grade estimation. Hence the positive result is deemed encouraging and worthy of continued exploration. Ullu (Greenlandic for '*the Nest*') is a NE-SW striking topographic depression situated only one kilometre away from a major terrane boundary between Archaean grey gneisses to the west, and the Archaean Tasersuaq granodioritic gneisses to the east, within the vicinity of a regional noritic dyke. This significant tectonic boundary may represent an important control on kimberlite emplacement. Significantly Ullu also represents the northeast continuation of a highly prospective kimberlite indicator mineral trail previously identified by the Geological Survey of Denmark and Greenland [1]. The trend of the Ullu float extends 1 km to the distinct magnetic target TMR-Q1-14. At Ullu over 200 boulders of kimberlite, up to 1.5 m in size occur within a well-defined 250 x 550 m area, partially covered by a glacial boulder field. Rare examples occur in which the kimberlite float at Ullu delicately preserves their contact with K-feldspar-phyric orthogneiss, which taken in combination with the volume of float observed supports a proximal, if not underlying source. Prior diamond exploration within the WG-NAC has shown that due to preferential weathering, it is unusual to be able to establish an in-situ source for kimberlite float without drill sampling. It is expected that geophysical techniques such as ground magnetics or resistivity however, may assist in establishing the depth and dimensions of any buried source rock.

References:

- [1] Jensen et al. (2004) Danmarks og Grønlands Geologiske Undersøgelse Rapport 2004/117.
- [2] Aber Resources Ltd (1997) Unpublished report, GEUS report file 21502, 28 pp.
- [3] Grutter et al. (2004) Lithos 77: 841-857
- [4] Hutchison and Frei (2009) Lithos 112S: 318-333