12th International Kimberlite Conference Extended Abstract No. 12IKC-014, 2024

Dachine Revisited

J. Letendre
Exploration Renouveau Inc.

Introduction

The Dachine exploration project is known in literature for the presence of a highly diamondiferous ultramafic sheet some 300 to 1000 m in thickness stretching for approximately 5 km northwards from the Grand Inini River. Apart from its large size, the body is also distinguished by its great antiquity (Paleoproterozoic age, 2.2 Ga), its metamorphism into a talc-chlorite-tremolite schist, its very high diamond contents, but also for its unusual diamond population.

In this study, we will focus on the exploration history of the Dachine diamond deposit, from its initial outlining in 1978/1979 by the French Bureau de Recherches Géologiques et Minières (B. R. G. M.), to the definite identification of the primary source rock in 1994 by Golden Star Resources Ltd. (GSRL; this designation includes its local French subsidiary, Guyanor Ressources S. A.) and on the intensive prospecting campaigns performed by the latter into 1997 in and around the Dachine permit area. We will concentrate on macroscale aspects of the Dachine komatiite. This report shall also briefly summarise observations made by the author in the course of a field visit to Akwatia, Ghana in 1997. The bulk of the information cited below is derived from Letendre (1998) and Letendre and Crawford (1998).

Exploration programs at Dachine: 1975 to 1997

Regional heavy mineral prospecting carried out by the B. R. G. M. from 1975 to 1977 throughout the French Guiana basement recovered diamonds at only four alluvial sampling sites, all on the Grand Inini Creek drainage (fig.1). Three additional diamond-positive sites were detected in 1978 in the headwaters of the Grand Inini, in an area designated as IT 33. Additional prospecting of IT 33 performed from 1979 to 1981 by the B. R. G. M. defined the eastern and western limits of a large diamondiferous zone, both in surface soil and eluvium, ascertained that chrome-rich chromite was the only kimberlite indicator mineral (KIM) recovered, and discerned Cr, Ni, and Mg anomalies in the overlying soil. However, the B. R. G.M. failed to conclusively identify the primary source of the diamonds and abandoned the project.

In 1994, a due diligence visit paid to the site by the author to confirm the B. R. G. M. findings returned diamond counts per unit volume equal or higher than those obtained by the B. R. G. M. at identical locations. The abundant Cr-rich chromite recovered showed a significant proportion of diamond inclusion chemistries. Thus, in 1995, GSRL proceeded to secure a B-type exploration permit designated as Dachine covering an area of 25 km^2 over part of the IT 33 occurrence. The diversified exploration activities performed by GSRL in 1995, not only reproduced the Cr, Ni, and Mg anomaly in soil identified earlier by the B. R. G. M. and identified the talcose bedrock as talc-chlorite-tremolite schist, but also indicated a diamondiferous ultrabasic body at least 3.5 km in length. In December 1995, GSRL entered into a joint venture agreement with BHP Minerals International (BHP). Exploration results from the ensuing1996 joint campaign showed clearly that the diamondiferous body extended further to the north while the metaultramafic lithologies intersected by drilling were variously described as tuff or ash to lapilli tuff, diamond distribution varying considerably in the core. Results from a 186 t bulk eluvium/bedrock sample

proved disappointing so that BHP abandoned the joint venture with GSRL in March of 1997. Lastly, in 1997, GSRL strived to further assess the economic viability of the project by characterizing the +1.0 mm diamond population through a significant alluvial bulk sampling program. A total of 73.93 carats of +1.0 mm diamonds was recovered from 29 m^3 of diamond-bearing gravel, the largest being just over 4.5 mm in diameter and the grades reaching up to 4.23 ct/m^3. The parcel was evaluated at an average of US$1.80/ct.

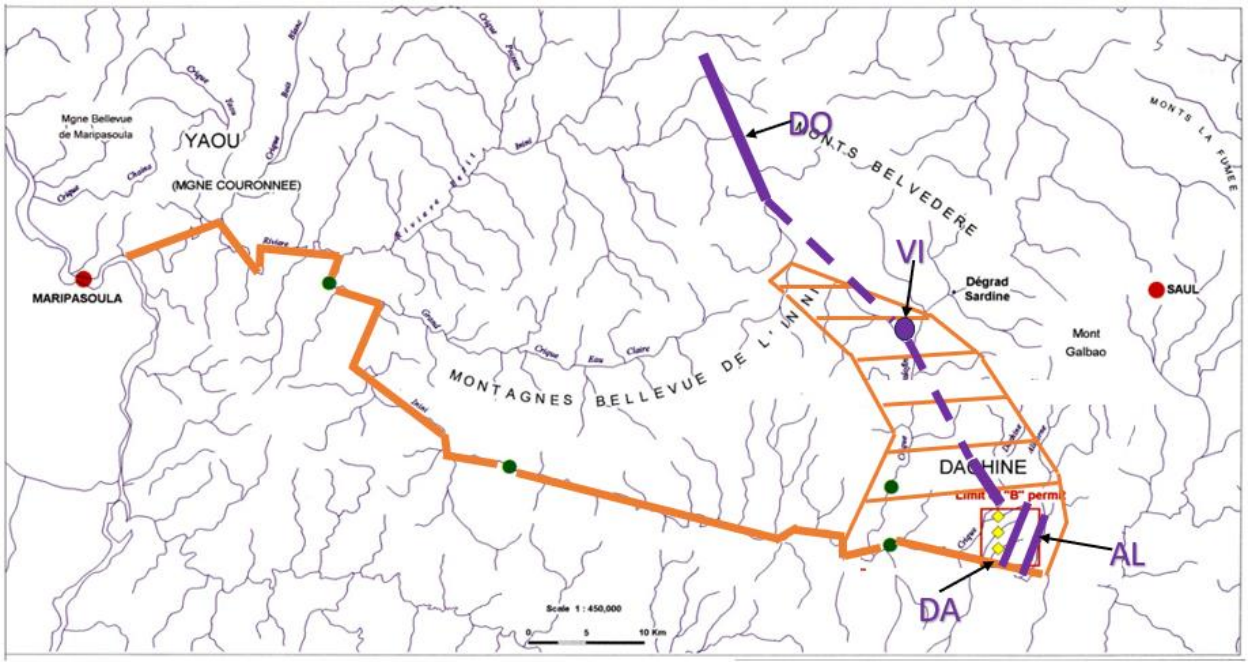

Figure 1: Schematic map showing the outline of the Dachine permit (red), the general trend of the ultramafic lineament (purple; solid line or circle – mapped, dashed - interpreted), the location of the Dachine (DA), Alicorne (AL), Vitória (VI), and Dorlin (DO) sectors of the belt, the diamondiferous drainage (orange), and the B. R. G. M. diamond occurrences from the 1975 (green circles) and 1978 (yellow diamonds) prospecting campaigns.

Exploration programs off the known Dachine belt and/or the B-type permit area: 1996 and 1997

The company's effort to find extensions of the Dachine belt in and outside the B-type permit first started from within the permit area itself, and then proceeded to the north of it where the ultrabasic body was known to extend. As geological mapping of the permit progressed in 1996, a new, isolated outcrop of volcaniclastic ultramafic rock was discovered within its boundaries. Labelled Alicorne, the significantly diamond-bearing talc tremolite schist body appears to be unrelated to the Dachine unit.

In the Dorlin gold exploration project area located some 40 km northwest of the Dachine permit, available soil geochemistry data revealed the presence of an 11 km-long basic to ultrabasic lineament that traverses the area in a north-south direction. The structure was historically described as a possible komatiite flow. GSRL geologists carried out a significant exploration project at Dorlin in 1996. Unfortunately, the talc schist, both from surface occurrences and archived core, proved barren of diamonds, although chromite was abundant. This pattern was reflected in the stream sediment sampling effort that targeted the lineament which proved otherwise identical to Dachine. The above suggested that both units could represent one coherent belt. This was supported by the recovery by the B. R. G. M. in 1975 of two diamonds on Palofini Creek located midway. A reconnaissance program of stream sampling and geological prospecting designed to establish a link between the two features resulted in the discovery of a surface exposure of volcaniclastic rocks off Palofini Creek at a site named Vitória. The bedrock, classified as talc-chlorite-tremolite schist,

probably volcaniclastic metaultramafic rocks, proved diamondiferous and chromite-bearing, as did the bulk of stream sediments collected in the region. Lastly, a reconnaissance project executed by GSRL along Grand Inini Creek, from Dachine to its mouth at Maripasoula, showed that diamonds from the Dachine ultrabasic lineament are spread throughout the drainage downstream, a distance of well over 75 km.

Review of Dachine analogues

In a search for Dachine analogues, only one lithology was identified by us as a close equivalent; the primary source rock of diamonds at Akwatia, Ghana which Canales (2005) argues is a Karasjok-type komatiite. Canale's positive comparison with Dachine is very much in line with that of the author of this paper who had a first-hand view of the ultramafic body at Akwatia during a visit to the project then held by the (now defunct) Canadian junior explorer Carlin Resources Corp. (Carlin) in early 1997. Carlin's Volta Diamond project was located in the immediate vicinity of the Birim alluvial diamond workings which a long history dating back to the 1920's. During the 1996-1997 field season, Carlin discovered five ultramafic bedrock zones carrying *in situ* diamond values up to 0.5 ct/m^3. The visit paid by the author to the site coincided with the company performing trenching on said zones. In particular, samples of ultramafic rocks from the Lion Trench stood out as being visually identical to Dachine metatuffs (they were described independently by GSRL from a thin section as a phlogopite-tremolite-talc-serpentine schist, possibly volcaniclastic, metamorphosed in the greenschist facies, and displaying a relict fragmental texture). The 50 m-long Lion Trench exhibited a number of lithologies ranging from greywacke to coarse-grained ultramafics with uniform rounded xenocrysts. To the east, the ultramafics contained noticeable lenses of black shales.

Conclusion

Following the discovery of diamonds in alluvium from the Grand Inini Creek drainage in the mid 1970's by the B. R. G. M., their delineation of an important diamond deposit in 1979-1981 to the definite identification of the primary source by GSRL in 1994, an extensive exploration effort was executed on the Dachine project area between 1994 and 1997. The work, carried on and beyond the permitted area by GSRL, served to delineate a continuous ultramafic unit at least 50 km in length and 300 to 1000 m in width, starting at Grand Inini Creek to the south, and stretching up to Dorlin gold project area in the north. The southern two thirds of the belt are known to be diamondiferous, but there is some evidence that diamond contents, both in terms of grade and size distribution, increases gradually to the south, as does the coarseness of the ultramafics themselves. The body, a volcaniclastic komatiite, is mappable through the geochemistry of surface soils and the presence of abundant chromite, both in alluvium and eluvium. Diamonds from the body are present throughout the Grand Inini Creek drainage unto to the mouth of the river at Maripasoula, some 75 km away.

A visit to the Akwatia diamond field in Ghana by GSRL confirmed that the local primary source rock is a close fit with the Dachine ultramafics, both in terms of surface and bedrock geochemistry and petrography. The presence of lenses of black shale in the ultramafics at Akwatia (and possibly in the Dorlin sector of the Dachine belt) further supports the source rock is a komatiite as a black shale-komatiite association is documented from a number of komatiite localities world-wide.

References

Canale DG (2005) The Akwatia diamond field, Ghana, west Africa: source rocks. Dissertation, New Mexico Institute of Mining and Technology

Letendre J (1998) French Guiana – 1994-1997 – Compilation of exploration work and results. Golden Star Resources Ltd., Internal Report

Letendre J, Crawford J (1998) Summary report on diamond exploration to date for French Guiana. Golden Star Resources Ltd., Internal Report