



The Bagassi gold deposits on the eastern margin of the Houndé greenstone belt, Burkina Faso



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ABSTRACT

The Bagassi gold deposits are situated on the West African craton and hosted in Palaeoproterozoic rocks of the Houndé greenstone belt, southwest Burkina Faso. High-grade gold mineralisation is hosted in quartz–gold ± pyrite veins–lodes (V_{1A}), in dilational zones and narrow shears in the Bagassi granitoid, and forms the majority of the resource–reserve portfolio in the Bagassi exploration permits, with gold grades of 18–21 g/t. Shear hosted gold–pyrite mineralisation in quartz veins in dilational jogs (V_{1B}) occurs along narrow discontinuous shear zones that trend north–northwest in Birimian-aged metabasaltic units, and forms a secondary gold resource. Gold mineralisation is restricted to formation in the late Eburnean Orogeny and formed during a change from east–west to transcurrent compression and shearing. The Bagassi deposits demonstrate that granitoids emplaced prior to onset of the Eburnean Orogeny represent viable gold mineralisation in host rocks that are increasingly seen to be associated with significant gold resources.

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1. Introduction

The Bagassi gold deposits on the eastern margin of the Palaeoproterozoic Houndé greenstone belt are situated approximately 200 km west–southwest of the city of Ouagadougou in the Province of Mouhoun in Burkina Faso, and immediately east and southeast of the village of Bagassi (Figs. 1 and 2). The deposits are marked by a series of artisanal workings. High grade gold mineralisation is found in quartz veins, in small scale shears and in dilational zones, principally along the margins of a granitoid pluton intrusive to a metabasaltic sequence.

In 2012, the deposits became the focus of geological study to establish not only the temporal and spatial relationship of gold-bearing quartz veins to the host rocks, but to search for the down dip and plunge extensions to the orebody. It was considered important to constrain the kinematic control of shear zones that hosted gold mineralisation, and to develop a model for formation of gold deposits in the Bagassi permits. The results of those studies are reported here and a model for the formation of the deposits is proposed that takes cognisance of new regional models proposed by Allibone et al. (2002), Tshibubudze et al. (2009), Hein (2010), Baratoux et al. (2011) Metelka, et al. (2011), De Kock et al. (2011, 2012), Perrouy et al. (2012), and Tshibubudze (2014) for the tectonic development of the West African craton.

2. Exploration history

Gold exploration in the Bagassi region was conducted between 1974 and 1995 by the Geological Survey of Burkina Faso (BUMEGIB) who reported grades up to 12.3 g/t in quartz veins, and in 1995–1996 by Shield Resources (Cruickshank, 2011). However, focussed exploration only began in 2006 after the permits were transferred to Riverstone Resources who delineated the 55 Zone and Bagassi South and tested parts of a 6 km long north–northwest trending gold corridor. The corridor was interpreted from the north–northwest alignment of artisanal workings; the workings are oriented parallel or perpendicular to the strike of north–northwest trending rock units and small-scale shear zones within the interpreted gold corridor. The 55 Zone and Bagassi South deposits are spaced approximately 2 km apart (Fig. 2).

Soil geochemical surveys were conducted in 2005–2006 by Riverstone Resources with clear targets identified in mafic volcanics. A significant anomaly was located at the 55 Zone, which became the focus of RC drilling in 2007. Rock sampling was also conducted on quartz vein arrays hosted in mafic volcanics, with values up to 11.86 g/t Au. In 2010, Riverstone Resources commissioned a detailed airborne magnetic and radiometric survey over the Bagassi concession with line spacings of 50 m and flight height of 40 m.

In 2011, Roxgold Inc. acquired the exploration permit and began an intensive campaign of diamond drilling. Sibthorpe (2012) reported that of the 62 holes drilled, 62 intercepts were achieved with an average true width of 4.24 m and a weighted average gold grade of 21.26 g/t Au, thus defining the high grade character of the Bagassi deposit. In 2012, 91 diamond boreholes generated 90 intercepts with an average

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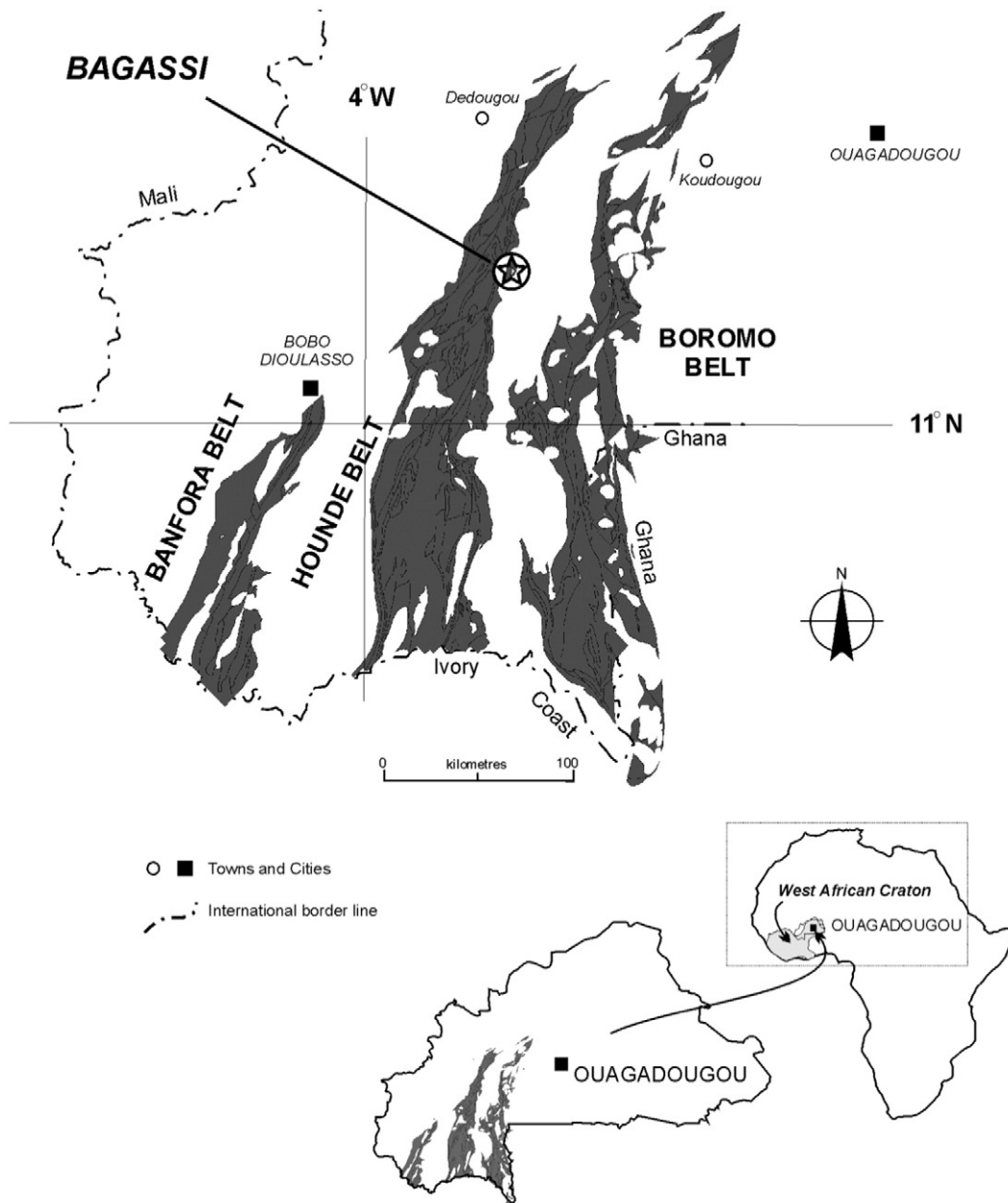


Fig. 1. Schematic map showing the location of the Bagassi deposits in the eastern Houndé belt of South West Burkina Faso, and 200 km west-southwest of the capital of Ouagadougou.

true width of 3.77 m and a weighted average grade of 19.7 g/t Au (Hrushewsky and Mantzoutsos, 2012). An initial resource estimate for the 55 Zone deposit returned 617,000 tonnes of Indicated Resource at 17.8 g/t Au for 354,000 Au ounces, and 1,244,000 tonnes of Inferred Resources at 7.7 g/t Au for 306,000 Au ounces (Roxgold, 2012). This was updated in August 2013 (Table 1) to an Indicated Resource of 1,904,000 tonnes at 13.88 g/t Au for 850,000 oz for the 55 Zone deposit, and an Inferred Resource of 860,000 tonnes at 9.88 g/t Au for 273,000 oz (Roxgold, 2013).

3. Regional geological overview

The Bagassi metallogenic zone and gold anomalies are situated on the eastern margin of the Houndé greenstone belt in the dominantly granitoid rocks located between the Houndé and Boromo greenstone belts (Fig. 1). The geology, structure and geophysical character of

the belts are detailed by Baratoux et al. (2011) and Metelka et al. (2011) and references therein; they are dominated by tholeiitic basalt and gabbro, calc-alkaline volcanics, and island-arc derived volcano-sedimentary sequences of the Birimian Supergroup (Baratoux et al., 2011).

The Bagassi deposits lie 7 km east of the north-northeast trending Boni Shear Zone (Fig. 1), which bounds linear sets of schistosed conglomerate and sandstone units of the Tarkwa Group (Bossière et al., 1996). The deposits are also situated 23 km southeast of the world-class Mana gold district (Houndé greenstone belt) (Fig. 1), which is owned and operated by SEMAFO.

The geology and metallogenesis of the Bagassi deposits are restricted to metamorphosed tholeiitic basalts and gabbros that are intruded by the Bagassi tonalite–granodiorite–(granite) pluton of unknown age. The tholeiitic basalt and contact with the Bagassi pluton are crosscut by northwest trending shear zones that host narrow gold-bearing

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