A new gold ore district Tijirit in Mauritania (Western Sahara)

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SUMMARY

The distribution of a new gold ore district in the Republic of Mauritania – Tijirit, which is associated with the greenstone belt (GSB) of Sebkhet Nich of submeridional extension, is substantiated. It is located 25–30 km to the east of the Reguibat GSB, where the large Tasiast gold deposit is known. The coincidence of the structural position of these two objects and direct signs of gold ore mineralization in the territory of the Tijirit ore district in the form of contrasting lithochemical anomalies of gold, grab sample and trench sample with an increased gold content make it possible to highly evaluate the prospects of its gold ore mineralization. In the ore district, four submeridional to north-northeast trending ore-bearing zones have been identified, within which a number of gold occurrences have been established. They coincide with the weakened zones of the same direction, as a rule, they are confined to the contacts of rocks of different composition (metabasalts, metasandstones, banded iron formations, granites). The most interesting for further geological exploration works is the relatively poorly studied Eastern mineralization zone, which is confined to the contact of the Salma granites and the metabasites of the eastern limb of the Sebkhet Nich GSB.
Introduction

Formulation of the problem. Several gold deposits have recently been discovered in Mauritania, the largest of which is the Tasiast in the northwest of the country, which is associated with the Mesoarchean Reguibat greenstone belt (GSB) of submeridional extension. The Tijirit gold ore district is located within a similar GSB 25–30 km to the east of the previous one. The coincidence of the structural position and the presence of signs of gold mineralization in Sebkhet Nich GSB, to which the Tijirit ore district is confined, make it possible to highly evaluate its gold ore potential and consider it as a promising gold ore district.

Analysis of previous studies. In the area of the Tijirit gold mining area, specialists of the gold mining companies Algold, Ausenco, and Aura Energy Limited discovered and investigated a number of promising areas and objects (Algold: 2018; BGS, 2004; 20042; Ciesielski, 2015; Davies, 2012; SGS, 2016, 2018; Strong results for Algold...; Zwirz et al., 2018). A total of 721 wells (with a total length of 91,043 linear meters) were drilled on the territory of the district, 265 trenches were dug up, 76,297 samples were taken and analyzed, 220 mineralization objects were identified, with an average gold content of 2.7 to 3.0 g/t. Inferred, Indicated, Measured Resources were calculated for the promising areas of Sophie, Eleonore, Lily.

Unsolved parts of the problem. There are some gaps identified: no general description of the Tijirit ore district, its structure and mineralization spatial features, the factors and criteria of gold mineralization and the direction of future mining operations.

Formulation of the goals. Therefore, the main task of this study is to determine the factors and criteria of gold mineralization, the spatial location of mineralization zones, and the determination of directions for further geological exploration. The overview is based both on public reports and own materials, gathered in 2018 and 2022 after prospecting work on the southern flanks of the Tijirit district (Virshylo et al., 2021).

Geological position and approach

The Tijirit gold ore district is located in northwestern Mauritania, within the Reguibat craton, which is composed of deeply metamorphosed Mesoarchean rocks (gneisses, granitogneisses, amphibolites, migmatises, granites), with an age of 3.1–2.9 billion years, overlain by a submeridional GSB composed of a series of volcanogenic-sedimentary rocks (basalts, tholeiites, graywackes, bands iron ore formations (BIF), slates, etc.), metamorphosed in greenschist, occasionally in amphibolite facies. They are controlled by a series of weakened zones of the same strike, mostly of shear nature (Key et al., 2008). The Tasiast gold deposit and the Tijirit ore district belong to the GSB (Figure 1).

The Tasiast gold deposit is the most important gold ore object in Mauritania, developed by the Canadian company Red Back Mining Inc. began in 2007. In 2018, 8.6 tons of gold were mined here. The ore bodies of the deposit are confined to BIF horizons within the Archean Reguibat GSB. The mineralization is represented by submeridional bodies of magnetite quartzites with layers of impregnated sulfide ores up to 25–50 m wide with an Au content up to 3 g/t, with lenses of rich ores up to 1.5 m thick (up to 100 g/t Au). The total Indicated & Measured Resources of ores in this deposit are estimated at 74.7 million tons with an average Au content of 1.2 g/t (90.8 tons of gold), and Inferred Resources – at 120 million tons with an average Au content of 1.9 g/t (231 tons of gold).
Results

**Tijirit gold ore district** is located within Sebkhet Nich GSB. It is composed of bands of basic and ultrabasic (basalts, tholeiites, komatiites), medium and acidic (andesites, dacites, rhyolites) volcanic and metasedimentary rocks, including BIF. The contacts of strata usually coincide with faults and weakened zones. This complex is broken by granite and granodiorite intrusions, mafic dykes.

The mineralization are related to parts of sulfidization and silicification within weakened zones of submeridional extension, often located at the contacts of metaintrusive and metasedimentary rocks, metabasites and metasedimentary formations, metasedimentary rocks and BIF. They are mainly represented by silification zones, quartz and quartz-carbonate veins and stockwork with gold mineralization. Dozens of prospecting occurrences are known in the area, the main of which are (from the west): Sophie-I, II, Sophie-III, Lily, Eleonore, Eleonore East, Salma (Figure 2). In the general structural plan, they form four zones of mineralization of the submeridional direction, according to the general structure of Sebkhet Nich GSB.

Within these three zones of mineralization, 721 wells (91,043 linear meters) were drilled on the Sophie-I, II, Sophie-III, Lily, Eleonore gold occurrences, where ore intervals were discovered. This confirms the prospects of mineralization zones and inventory estimation of Inferred, Indicated, Measured Resources. The total resources of these occurrences are estimated at 818,240 ounces of gold, or 26,307 tons of gold (Table 1).
Figure 2 Contours of lithochemical anomalies of the Tijirit area with Au content of 0.03–0.1 g/t (blue color) and grab samples with Au content of more than 1 g/t (red symbols) (SGS, 2016)

Table 1 Resources of promising occurrences (SGS, 2018)

<table>
<thead>
<tr>
<th>Category</th>
<th>Eleonore</th>
<th>Sophie + Lily</th>
<th>Total gold Resources, t</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Content Au, g/t</td>
<td>Ore volume, t</td>
<td>Gold Resources, t</td>
</tr>
<tr>
<td>Measured</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Indicated</td>
<td>4.08</td>
<td>71 900</td>
<td>3.030</td>
</tr>
<tr>
<td>Inferred</td>
<td>4.07</td>
<td>3 016 000</td>
<td>12.690</td>
</tr>
<tr>
<td>Total</td>
<td>-</td>
<td>3 087 900</td>
<td>15.720</td>
</tr>
</tbody>
</table>

The structural position of the known areas, the location of Au lithochemical anomalies and grab samples with increased Au content allows us to predict the presence of four extended zones of mineralization submeridional direction. To the south, in the region explored by authors the intensity of gold mineralization decreases. Of greatest interest is the relatively poorly studied Eastern mineralization zone, which is located at the contact of the Salma granites and metabasite complex of the eastern flank of the Sebkhet Nich GSB with layers of serpentinites, metaandesites, porphyrites, metasandstones, BIF, gabroids and felsites broken by dikes. Within the zone, a number of occurrences have been uncovered by drilling over 9 km from north to south, where the Au content varies from 0.62 to 16.95 g/t at a thickness of 1 to 16 m. These data have not previously been used to estimate mineral resources of zone.

Conclusions

The allocation of the new Tijirit gold ore district in Mauritania, which is associated with Sebkhet Nich GSB, is substantiated. Within its boundaries, four ore-bearing zones of submeridional extension have been identified, where a number of gold occurrences have been established: Sophie-I, II, Sophie-III, Lily, Eleonore, Eleonore East, Salma. They coincide with weakened zones of the same direction, are confined to the contacts of rocks of different composition (metabasalts, metasandstones, BIF,
granites), stand out on satellite images, in geophysical investigation, and control the position of mineralization zones. Of these zones, the relatively poorly studied Eastern mineralization zone, which is confined to the contact of the Salma granites and metabasites of the eastern flank of the Sebkhet Nich GSB, is of greatest interest for further geological exploration. The Eleonore East and Salma gold occurrences, numerous lithochemical anomalies, grab, trench and core samples with increased Au content (up to 42–100 g/t) are associated with it. It is recommended to concentrate further geological exploration work within this zone. According to the category of Inferred Resources, the ore potential of this zone can be estimated at 15 tons of gold, and the total resources of the Tijirit gold ore district – at 40 tons of gold, which certainly represents significant economic interest.

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Strong results for Algold Resources at Tijirit Project in Mauritania / https://www.miningglobal.com/smart-mining/strong-results-algold-resources-tijirit-project-mauritania
