

Drilling analysis and prospecting prediction of Ereen gold ore in Mandal Soum, Selenge province, Mongolia

The Ereen deposit lies within the North Khentei gold belt. The exploration works undertaken at Ereen have shown significant mineralization in and around the existing known vein gold mineralization. Work to date has delineated a mesothermal quartz vein system with volcanic-hosted disseminated mineralization associated with quartz-sericite carbonate and intensive silicification alteration zones. The area has approximate dimensions of 750 × 650m and assay results indicate gold mineralization averaging 1.7g/t. Geophysical and geochemical data appear coincident, though drilling has shown that it is the gradient areas of the IP anomalies which appear most prospective. This has meant that some early holes did not intersect mineralization, but the more recent holes have been better targeted.

Keywords: Ereen deposit, prospecting prediction, gold, drillings.

1. Introduction

The North Khentei gold belt has a long history of placer mining and includes gold reserves in both placer and bedrock deposits. Gold placer deposits form a series of geographically distinct placer districts preferentially located in the vicinity of the bounding faults of the North Khentei trend. Zamar, Bumbat and Sharingol placer districts are roughly parallel to the Bayangol fault system; Huder, Tolgoit, Ikh Alt, Yalbag and Gatsuurt placer districts are located in the vicinity of the Yeroogol fault. Reserves of the Zamar and Sharingol gold placer districts total approximately 3.0 m oz. The Bumbat deposit (0.6 m oz Au), the Gatsuurt, and Boroo deposits (1.2 m oz Au) are bedrock gold deposits within the belt.

The Ereen property is located in north-central Mongolia approximately 42 km to SW from the centre of Mandal Soum, Selenge province and 140 km to NNW of Ulaanbaatar, capital of Mongolia. The Dzüünharaa, one of the largest stations on the Trans-Mongolian Railway is located 35km to the north.

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The main towns in the area are served by good infrastructure including power, water and communications. It is the detailed location in north-central Mongolia. There are two main access routes to the Ereen site; by paved road from Ulaanbaatar to Bornüür (110km) and then approximately 50km on dirt road to the site, or 136km to the north of Ulaanbaatar to Boroo gold mine's improved earth road, and then approximately 30km by unpaved road to the site.

2. Geology of the region and deposit

Ereen deposit is located near to the principal gold deposit in the district, Gatsuurt mine, developed by Centerra Gold Corporation. The Sujigtei fault separates Devonian rhyolites (which host Ereen) in the west from Palaeozoic granites in the east. Therefore, certain Gatsuurt ore controlling features could be similar to Ereen ore-controlling factors. Stratigraphic section of the Ereen area is consecutively represented by Cambrian-Ordovician Kharaa group formation, Ordovician-Silurian Undur formation, Silurian Mandal group formation, Devonian Uaan Undur formation, Jurassic-Cretaceous Ajnai white fracture formation, lower Cretaceous Shariin Gol formation, Quaternary Holocene sedimentary formation. Plutonic rocks are spread moderately in the project area. From the previous research the following groups of plutonic rocks were identified on the basis of the geologic-structural location, stratigraphy deposition and border relation towards each other, petrography, and petrochemical characteristics.

1. Medium late Ordovician Boroo river formation
2. Late Ordovician Ikh Tashir formation
3. Medium Devonian rock formation
4. Permian Guadeloupean small Khentii formation
5. Early Triassic Tukhum formation

3. Mine geology

Gold grades vary from trace to 409g/t along the strike and depth extension of the vein. Better grades (from 14g/t to 363.4g/t) of Au were distributed in the middle and deeper parts of the vein, with near-surface grades (down to 40m) considered uneconomic. The average gold grades were 18-23g/t in different blocks.

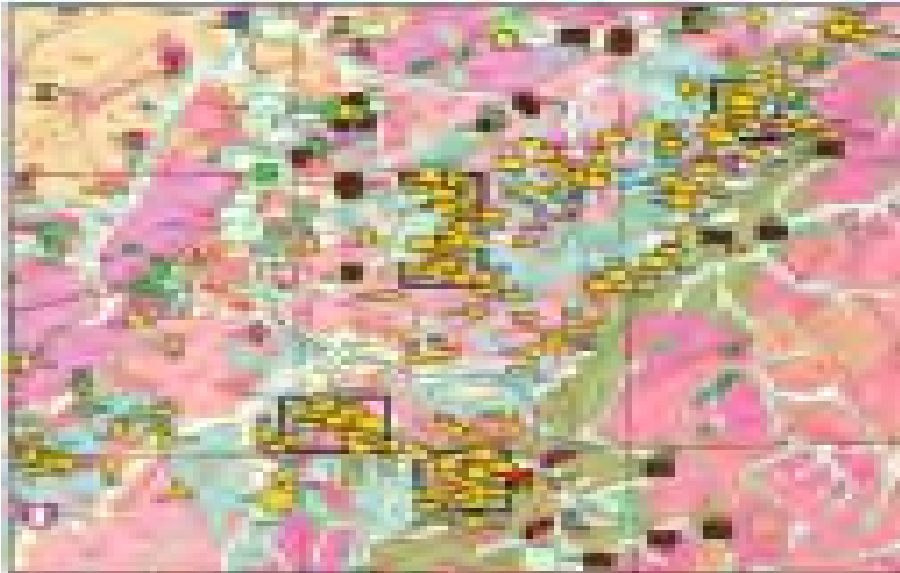


Fig.1 Distribution of lode and placer gold deposits in North Khentii terrain (442 is Ereen deposit)



Fig.2 Regional geology of Bayangol terrain

Ore minerals are pyrite, arsenopyrite, tetrahedrite, chalcopyrite, sphalerite, galena, scheelite, malachite, azurite, limonite and free gold. Free native gold is associated with quartz, galena and arsenopyrite. The average size of visible Au was reported to be of 1mm. Vein 2 is located in the north-east part of the deposit, strikes north-east and dips gently (12°) to the north-west. It has a strike length of 200m and an average thickness of 0.4m. Trenching undertaken between 1959 and 1960 showed the average thickness of the vein to be of 1m on surface and to be surrounded by a 7m wide silicified halo. Gold grade varied from 0.5g/t to 2.7g/t on the surface.

4. Alteration

The gold mineralization in Ereen deposit is confined spatially with hydrothermal alteration of rhyolites therefore were a subject of special attention during drill core logging. Rhyolites cover a wide area within the Dzun-Modo ore region in the south part of Hentey ridge and are traced along east-west direction for 15-20 km and along north-north-western direction for 25-30km. The host rocks for rhyolites are represented by Ordovician chlorite, chlorite-actinolite, and calcian metamorphosed schists of Kharinsky suit and by Palaeozoic granites and granodiorites. Ereen gold deposit's geological section is represented by rhyolites down the depth of at least 300-350meters.

5. Drillings

During W.E. site visit no drilling programme was being done. Also due to heavy snowfall there was no access to drilling sites. W.E. visited core shack at Ereen exploration camp discussed with geological team drilling and sampling procedures (Fig.4). W.E. made statistical analysis.

Drilling at Ereen started in 2007, 44 drillholes totalling approximately 10,000m of drill core have been completed, core sample collected and assayed for gold. From this work, the mineralized area has been broadly defined. 1792m drilling of four diamond holes at Ereen and of five holes at Baavgait (Fig.5) were drilled. All holes at Ereen and four holes at Baavgait have intersected gold-

containing intervals and were used for an upgrading of the resource figures.

The majority of holes drilled at Ereen were inclined and thus down hole surveys to determine hole deviation supposed to be performed twice, in some cases three times for drill holes with total depth of 250m, we noticed that drill hole traces displayed on cross-section are in a straight line and no down hole survey was employed. Also in other works 3D mode of ore body and resource blocks were outlined with straight traces of boreholes. The Ereen deposit's geochemical anomaly, which has a north-eastern strike, has Au-Pb-Zn-Cusignature and occurs inside the zone of north-easterly

striking regional fault. Gold-in-soil anomalies occur in the northern part of the Ereen area and coincide with intense mineralization as defined by drilling and with a deep-seated IP anomaly. Thus, the geochemical anomalies of the Ereen area are considered to be highly indicative of mineralization and are open for further exploration to the north-east and south-west.

6. Sample preparation and assaying

The drill core sampling has been done at even 1m intervals, though non-mineralized intervals were sometimes sampled at 2m intervals. The original drill core was cut for two equal halves using diamond saw at the site before shipping it to ActLabs in Ulaan Baatar for sample preparation and assaying. The core storage boxes are numbered and sealed with the plastic and plywood. Currently CAML insert one (1) standard and one blank to every twenty samples as a part of QA and QC procedures. Blank samples are used to test the sample



Fig.4 Sample storage at Ereen exploration camp

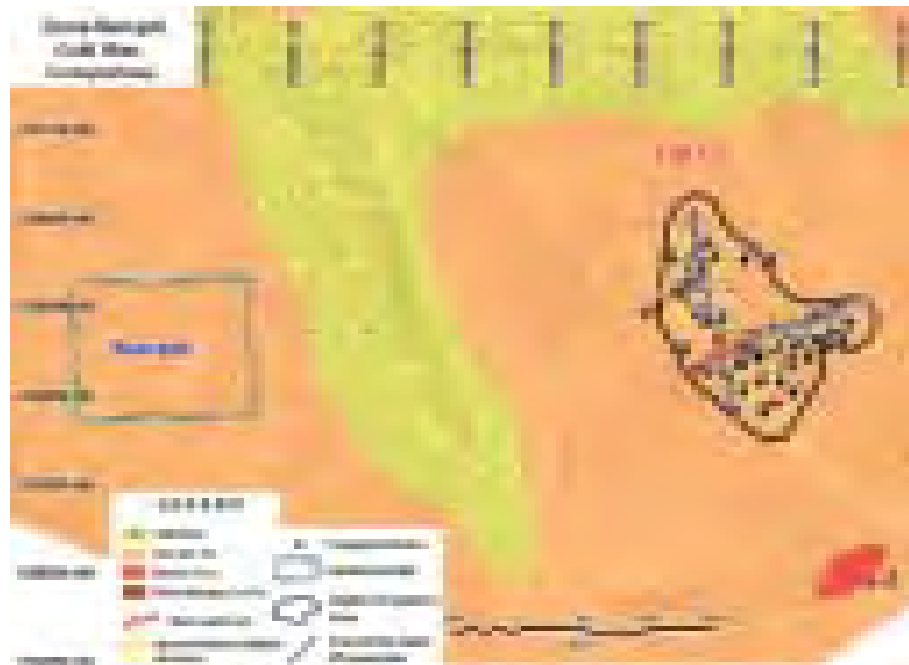


Fig.3 Geological map of Ereen-Baavgait area

contamination during the sampling, preparation and analytical process. The standards were purchased from the Actlabs Ltd, Baatar, Mongolia. A number of gold standards were chosen for the Ereen programme and each one was analyzed by us several times. The average deviation and standard deviation was calculated for each standard and subsequently used to evaluate the accuracy of the results via time plots. The sample preparation is currently done at ActLabs in Ulaan Baatar and SGS Mongolia. Core samples were assayed using an acid digestion process followed by fire assay (FA) and atomic absorption spectrometry (AAS) analytical methods. The sample preparation and assay preparation facilities were performed by experienced personnel with high-quality understanding of QA and QC issues. The quality of the analytical work performed was reviewed. The results are considered to be acceptable. The standards performed well, with only 5% failing. The accuracy of ActLabs gold results is acceptable.

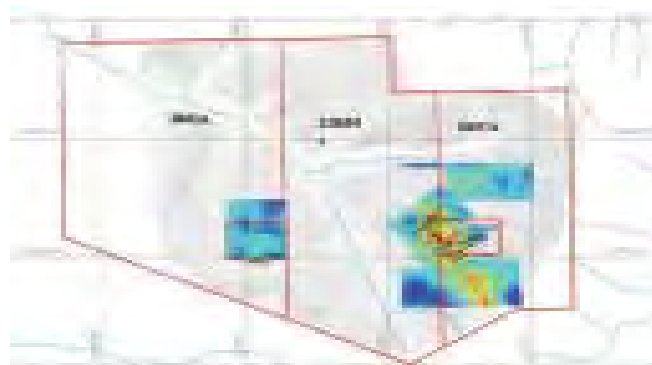


Fig 5 Ereen-Baavgait borehole location(yellow dots represent new opportunities)



Fig.6 Gold in soil anomaly on geology map

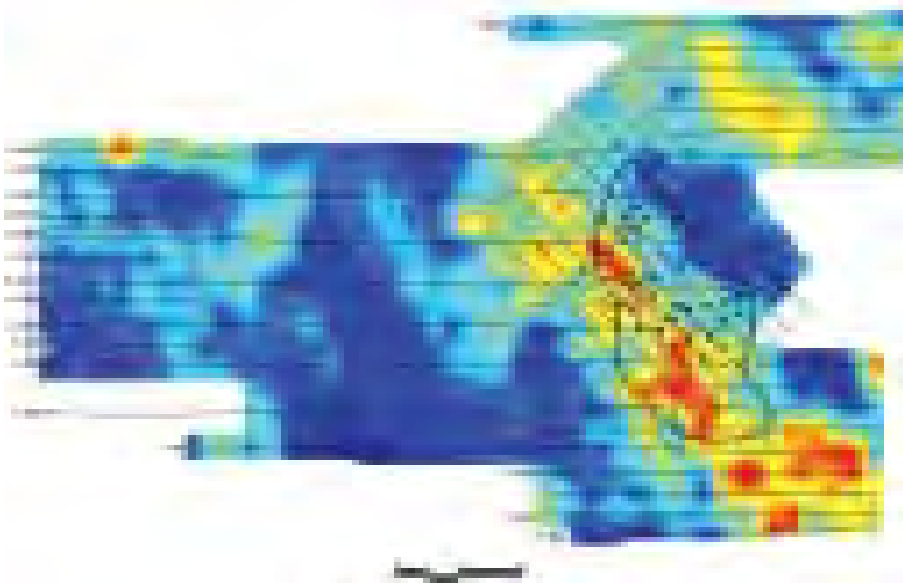


Fig.7 Ereen-Baavgait magnetic map

The check analyses of duplicates performed at the different labs are within accepted limits.

7. Drilling results

The drilling programme was initiated to verify the ore zone identified by prior geologists and the latest geophysical and geochemical anomalies. As a result, the following holes have found to be mineralized (Fig.7: ED-14, ED-12a, ED-25, ED-16, ED-40, ED-64, ED-62, ED-30, ED-15, ED-15b, ED-15a, ED-42, ED-13b, ED-14a and ED-17. Holes ED-03, ED-04 and ED-13, drilled in winter, were re-drilled in order to increase the depth; the maximum depth was 135m prior to re-drilling. These re-drilled holes were renamed ED-04a, ED-03a and ED-13a. Later,

these holes were relocated by 30-50m and drilled in order to verify the mineralization, alteration and geophysical section and numbered ED-04b, ED-03b and ED-13b.

Some good gold intersections include:

ED-1; 7 45-46m, 1m @ 2.54g/t; 94-98m, 4m @ 1.75g/t, and 210-217, 7m @ 1.66g/t

ED-40; 206-215m, 9m @ 3.37g/t (includes three intersections >5g/t Au

Figs.5-8 show a longitudinal section through the mineralized zones parallel to the IP anomaly from the north-west to south-east. One of the principal results of the drilling was the realization that the gold mineralization was related to the gradients of the IP anomaly and not the high intensity centre of the anomaly which may well be related to sulphide mineralization.

From these works, it has now been possible to divide the Ereen prospect up into three ore bearing zones as shown in Figs.5-9.

Zone A or ore body 1 - occupies the south-east of the area and has been defined by holes: ED-01, ED-02, ED-03, ED-04, ED-04a, ED-05, ED-06, ED-07, ED-08, ED-17, ED-17a, ED-40, ED-42, ED-44, ED-46, ED-50, ED-62 and ED-64. Holes ED-00, ED-09 and ED-52 are excluded from this list since they contain no considerable mineralization and ore bearing alteration was insignificant.

CAML considers that deeper (350-450m) holes should be drilled in order to verify the presence of mineralization.

Zone B or ore body 2 - this zone in the north-west of the area has been delineated by drillholes: ED-13a, ED-13b, ED-14, ED-14a, ED-16, ED-25 and ED-82. Also 3 more drillholes ED-10, ED-11 and ED-12 were drilled but no prospective gold mineralization was observed, though CAML believes that these holes were not drilled deep enough to intersect gold mineralization. The main ore body B is characterized by the results of drill holes ED-25, ED-16 and ED-14a. In addition, further drill targets may lie at depth peripheral to holes ED-26 and ED-28.

Zone C or ore body 3 - although there is no indication of

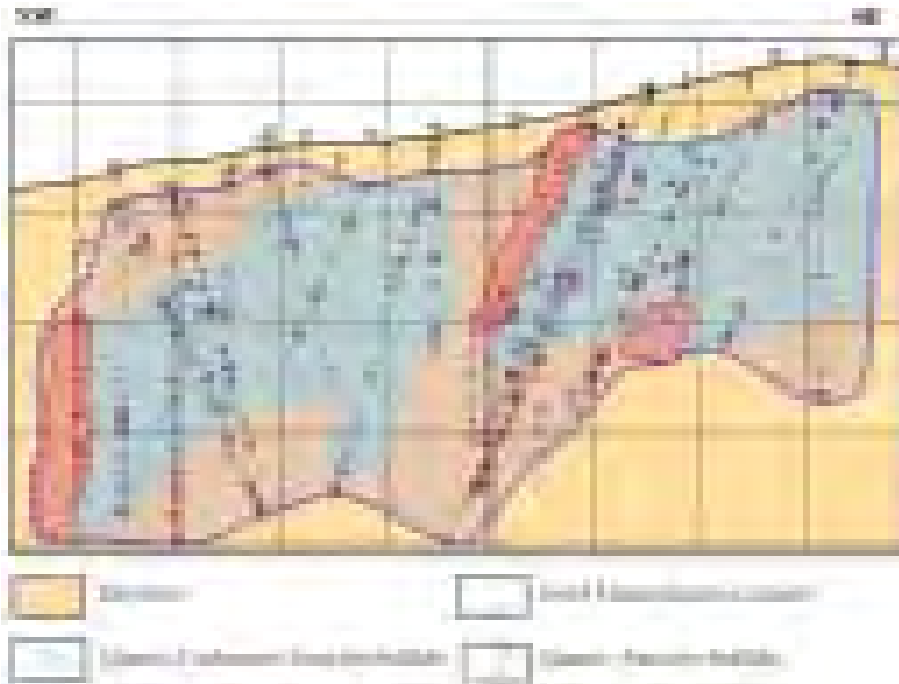


Fig.8 Longitudinal section through the mineralized zone

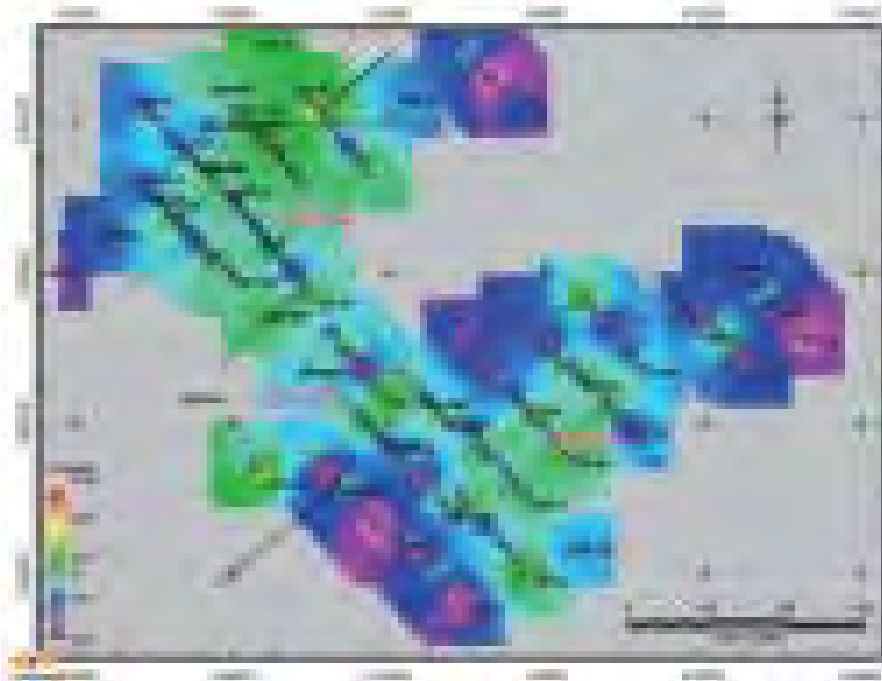


Fig.9 Ereen mineralized zones with borehole traces and intersected gold mineralization

outcropping mineralization, results of a few holes, drilled to verify the geophysical anomaly, show prospective gold mineralization. It is possible that a 1-5m thick ore body with grades higher than 5g/t Au may be present as indicated by holes ED-15c, ED-15a, ED-15b and ED-30, and as such continued drilling is recommended in this zone.

7. Conclusion and suggestions

The exploration works undertaken at Ereen have shown significant mineralization in and around the existing known vein gold mineralization. Work to date has delineated a mesothermal quartz vein system with volcanic-hosted disseminated mineralization associated with quartz-sericite carbonate and intensive silicification alteration zones. The area has approximate dimensions of 750 × 650m and assay results indicate gold mineralization averaging 1.7g/t.

Geophysical and geochemical data appear coincident, though drilling has shown that it is the gradient areas of the IP anomalies which appear most prospective. This has meant that some early holes did not intersect mineralization, but the more recent holes have been better targeted. The mineralization remains open at depth and has not been properly closed off laterally. Furthermore, no drilling has been undertaken at Baavgait, or in the zone between the two prospects which may yield additional mineralization.

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