Azerbaijan International Mining Company Limited

The ore sector in the Tethyan Metallogenic Belt: Structural geology, Lithology, Mineralization and new perspectives in Gadir low-sulfidation deposit, Gedabek district, Lesser Caucasus, Azerbaijan

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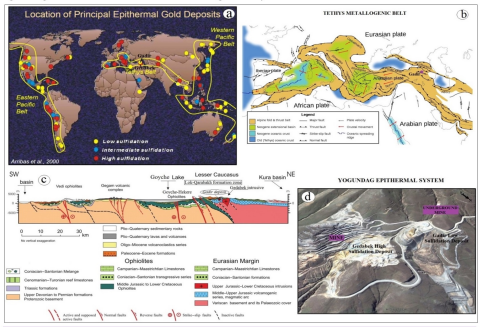
1. INTRODUCTION

The one of the recently discovered epithermal gold deposits with a low-sulfidation character is the Gadir deposit near Gedabek Mine. This deposit belongs to the Tethyan Metallogenic Belt, which itself is part of the Alpine-Himalayan orogenic system.

The Gadir low sulfidation deposit (Gadir LSED) was discovered during carrying out geological exploration works and mapping in the North-West flank of Gedabek Mine by Gedabek Exploration Group (GEG) and geological consultant Allahverdi Agakishiyev in 2012.

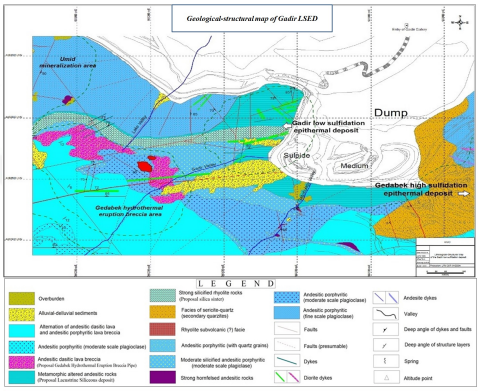


2. GEOLOGICAL SETTING

The NW Flank of Gedabek Mine is located in the Yogundag Mountain area at elevation 2085m which belong to Gedabek volcano-plutonic structure of Shamkir uplift of Lok-Karabakh structure-formation, Lesser Caucasus metallogenic zone. This structure elongated on Gedabek-Bittibulag abyssal fault system which is one of the main ore controlling faults in Gedabek ore district.

The Gadir low sulfidation epithermal Au + Cu + Ag deposits develop from dilute near neutral pH fluids and formed in arc low sulfidation condition: main ore and alteration minerals derived dominantly from magmatic source.

The Gadir LSED has complicated geological structure, and consists of different old and different composite intrusive bulks and fracture structure consisted of complicated with Middle and Upper Jurassic volcanic sediments. It has become complex with the intrusive masses and breaking structures of different ages and different composition.

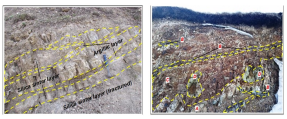


3. HYDROTHERMAL ALTERATION

During the field alteration mapping the following hydrothermal alteration was obtained in Gadir horst.

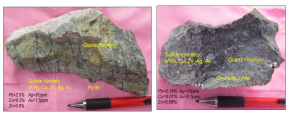
1. Propyllitic alteration mostly developed in North and North-West part of Gadir horst area and is observed in the andesitic tuff formation, in the external part of the deposit. The most common minerals of this alteration are chlorite and epidote.

2. Silica alteration layer was obtain above Gadir horst. The thickness of silica sinter in average 6-7m. This was one of the primary criteria indicated that Gadir horst belong to low sulfidation epithermal deposit. Another type of silica alteration on Gadir horst is ***3- lacustrine siliceous deposit (LCD).*** Sedimentary sequences of the LCD basin are in East part of Gadir outcrop



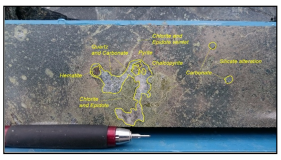
Silica sinter layer (left) and lacustrine siliceous deposit (right): A-silica sinter layer, B-hornfelsed andesitic tuff sedimentary layer, C-silica sinter layer filled by Fe oxide minerals, D-prophylitic altered breccia.

4. Phyllic (quartz-adularia-pyrite) alteration mainly and mostly related with Quartz Porphyry Body (QPB) where ore is localized. According to epithermal alteration model the drill holes intercepted the phyllic alteration around of massive sulfide stock. Quartz- adularia veins mostly developed in silicified hydrothermal breccias and stuff in QPB. The thickness of these veins is approximately 1mm.

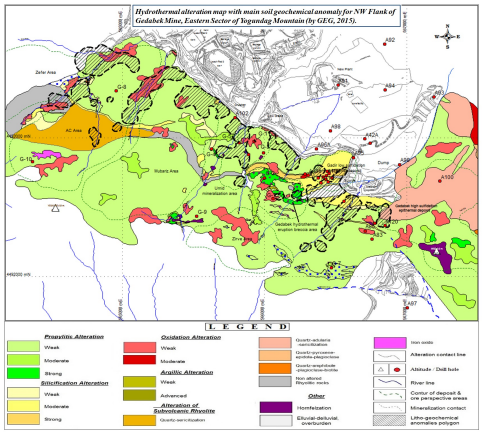


Phyllic alteration (left) and tourmaline in phyllic alteration (right)

5. Carbonate alteration also is observable on fractures of the rock and it is spread on volcanic and in quartz porphyry. Generally developed near fractured zones where intensity of carbonate veins and veinlets is higher. Also carbonate alteration is visible on volcanic rocks in nest and lenses which is filled by carbonate material and surrounded by epidote and chlorite.

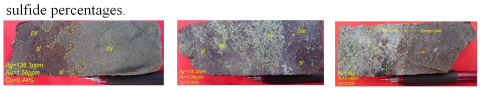


Carbonate alteration on volcanic rocks in Gadir deposit.



4. MINERAL ZONATION

The Gadir deposit is belong to Pb-Zn-Cu-Ag-Au vein deposit which is characteristic to Low-Sulfidation epithermal deposit. The main ore minerals pyrite, sphalerite, chalcopyrite and trace amounts of galena. Silver content of the deposit is highly variable. The higher grade silver zones tend to be peripheral to the high grade gold zones. The majority of the gold mineralization is very fine-grained (0.5 to 30 microns) occurring in locked grains in pyrite, chalcopyrite and sphalerite. Gold is also, to a lesser extent, present in galena. Higher gold grades, however, are not directly related to sulfide percentages.



Grades of quartz-sphalerite-pyrite stock (left), quartz-sphalerite-chalcopyrite-pyrite-barite (middle), quartz-pyrite-chalcopyrite association with quartz vein (right)

There is so possibility to follow following ore mineral located zones in the Gadir deposit:

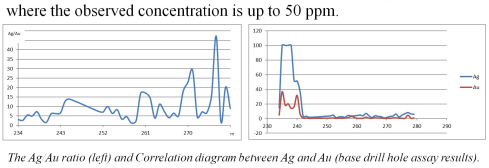
Quartz-sulphide Au + Cu mineralization zone is characterised by quartz and pyrite as the main sulphide with higher temperate chalcopyrite That ore mineralization zone is located close to high sulphidation Gedabek ore deposit.

To the upper Carbonate-base metal Au mineralization zone is located where overprint quartz-sulphide Au zone. In that zone is displayed higher Au contents, increased Ag:Au ratios, with additional sphalerite greater than galena, and an important carbonate component.

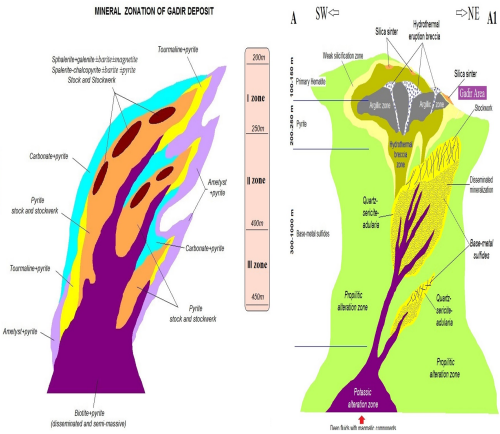
Polymetallic Ag-Au mineralization zone is in part transitional between quartz-sulphide Au + Cu and carbonate-base metal gold, but also distinguished from each of these, by differing mineralogy and geological environment. Zn and Pb dominant polymetallic zone constitute high silver, while rich chalcopyrite parts Au is richer.

Epithermal quartz Au-Ag mineralization veins form at the highest crustal levels (close to the surface) and late stage in the paragenetic sequence of intrusion-related low sulphidation Gadir deposit and so typically overprint carbonate-base metal Au mineralization zone.

The Ag/Au ratio (base drill hole assay results) various between 0.01 to 47 (maximum79), average about 10. As seen from diagram this ratio is not constant into depth which is characteristic for low sulfidation epithermal deposit. Ag is especially enriched in the hydrothermal breccia bodies, as well as in association with the polymetallic ores where the observed concentration is up to 50 ppm.



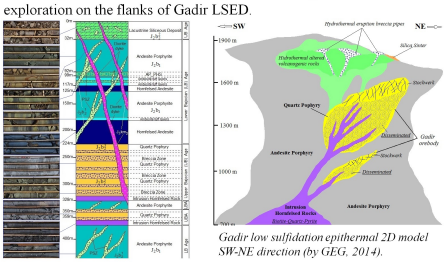
The Ag Au ratio (left) and Correlation diagram between Ag and Au (base drill hole assay results).



At the present there is underground mining at the Gadir LSED in a licensed open-field site (20.8 ha) near the North-West flank Gedabek Mine which located in the distance approximately 900 m from open pit mine.

Here are the probably outcrop of quartz porphyry subvolcanic formation of the Upper Bajocian aged was considered as the main factor, also observed intensive silicification alteration on surface. In the aim of discovering the ore formation in contact part of this rhyolite-dacite subvolcanic body was drilled bore hole in 2012. During geological-structural mapping, it has been defined Gadir Horst structure.

At the present there are underground mining activities and surface exploration on the flanks of Gadir LSED.



Stratigraphic column and typical core showing multiple hosts for NW Flank of the Gedabek Mine (also, Gadir LSED (by GEG, 2015)).

Gadir low sulfidation epithermal 2D model SW-NE direction (by GEG, 2014).

Abbreviations: PSZ-Propyllitic Silicification Zone; LB-Lower Bajocian; UB-Upper Bajocian.