Olympias

In Situ Recovery

CRM: Arsenic

Overview | Uses of As-Cu | Location

VE | In Situ Recovery Info | VEs Map

Disclaimer

CRM: Copper

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Overview

General Information

EldoradoGold is a Canadian mining company that has actively mining activities in different countries around the globe. Especially in Greece, the EldoradoGold department, franchised as HellasGold SA, focuses on mining activities at the Kassandra mining site in Chalkidiki. The Greek Multi-Metalic Ore deposit contains the following metals:

1) Critical Raw Materials such as Arsenic (As) and Copper (Cu)
2) Precious Metals such as Gold (Au) and Silver (Ag)
3) Base Metals such as Lead (Pb) and Zinc (Zn)

Specific Information

The Underground Multi-Metalic Sulfur Deposit Ore in Olympias Location (South-Western side of the Olympias mining site in Kassandra area) contains 8 ppm of Gold enclosed to the Arsenopyrite (FeAsS)

Due to the consecutive increase of supply risk in CRMs, the company purified Arsenic and Copper using aqua-acidic reagents and catalysts.

Olympias underground mining site has a depth range of 0-210m.

The 360 panoramas in the current VE refer to the southwestern active underground mining site and aim to demonstrate the active CRMs on-site recovery unit to separate the elements of Arsenic and Copper that are contained in the wastewater collected after the diamond drilling in primary extraction.

Images of Spontaneous Metals

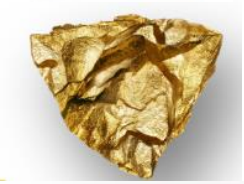
Underground Mining Structure

Criticality

Images of Spontaneous Metals

Arsenic (As) CRM
Arsenic occurs as a chemical compound of FeAsS known as Arsenopyrite

Copper (Cu) CRM
Copper occurs
as a chemical compound of $CuFeS_2$



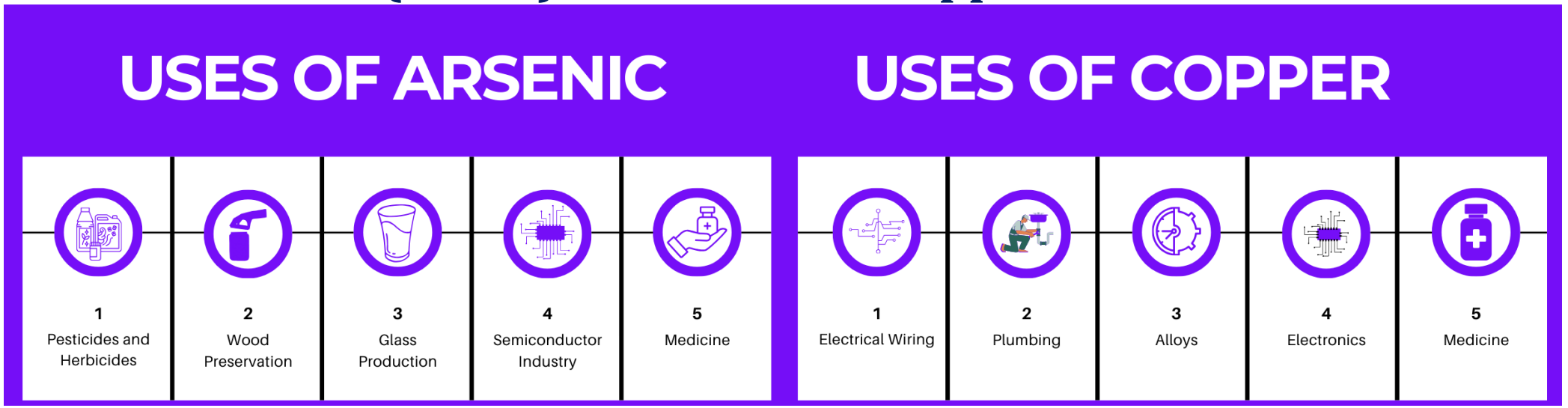
Gold (Au)
Gold is well-known as a precious metal. In Olympias mine ore,
the gold is enclosed in the structure of Arsenopyrite.
Its concentration is approximately 8.23 g/t

Silver (Ag)
Silver is well-known as a precious metal. In Olympias mine ore,
its concentration is approximately 131.5 g/t

Lead (Pb)
Plumbum-Lead is well-known as a base metal. In Olympias' mine ore,
its concentration is approximately 4.16%

Zinc (Zn)
Zinc is well-known as a base metal. In Olympias mine ore,
its concentration is approximately 4.74%

Spontaneous Metals (As, Cu) and Industrial Applications



Arsenic (As)

Arsenic occurs as a chemical compound of FeAsS known as Arsenopyrite.

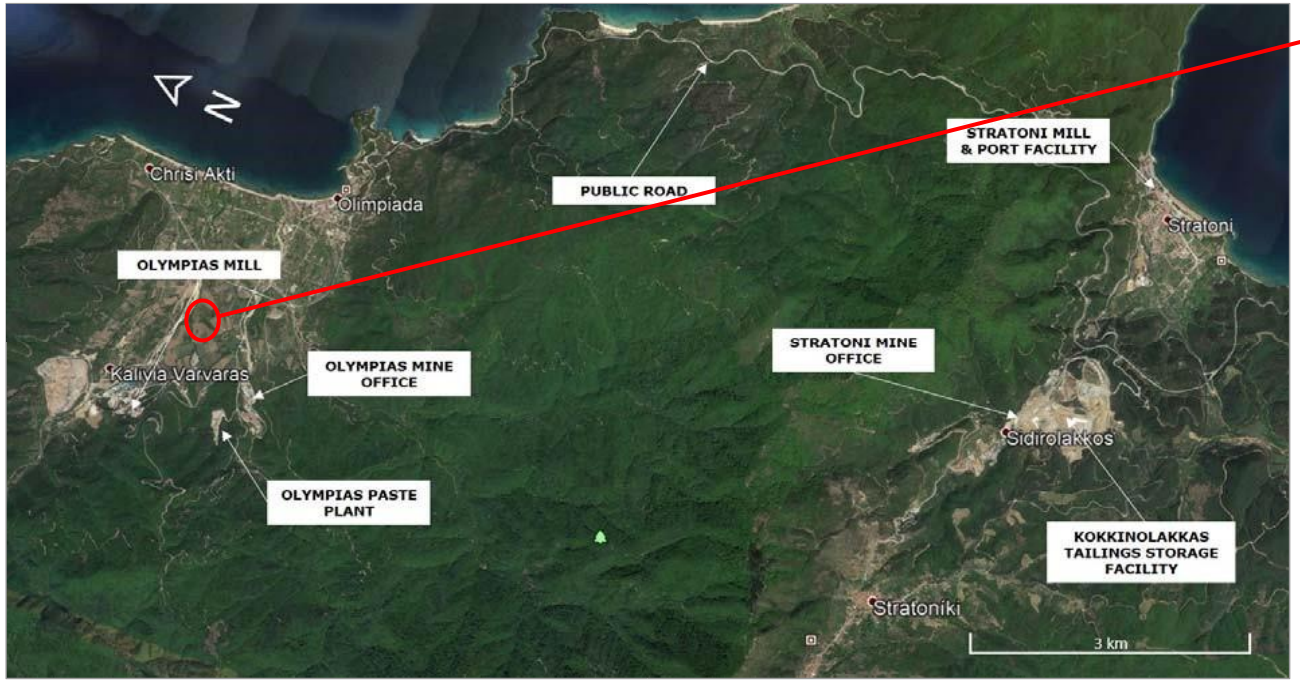
Copper (Cu) CRM

Copper occurs as a chemical compound of $CuFeS_2$ known as Chalcopyrite.

Geotechnical Structure for Sustainable Mining

Structure Information

Based on geological and geotechnical studies, the company has located valuable mining sites containing plenty of Arsenic and precious or base metals. In the Olympias underground mining site, there are separate sections that are activated independently. For instance, when a downstream level is active, the levels over it are not, and vice versa. This happens to avoid collapsing due to the vibration of machinery equipment.

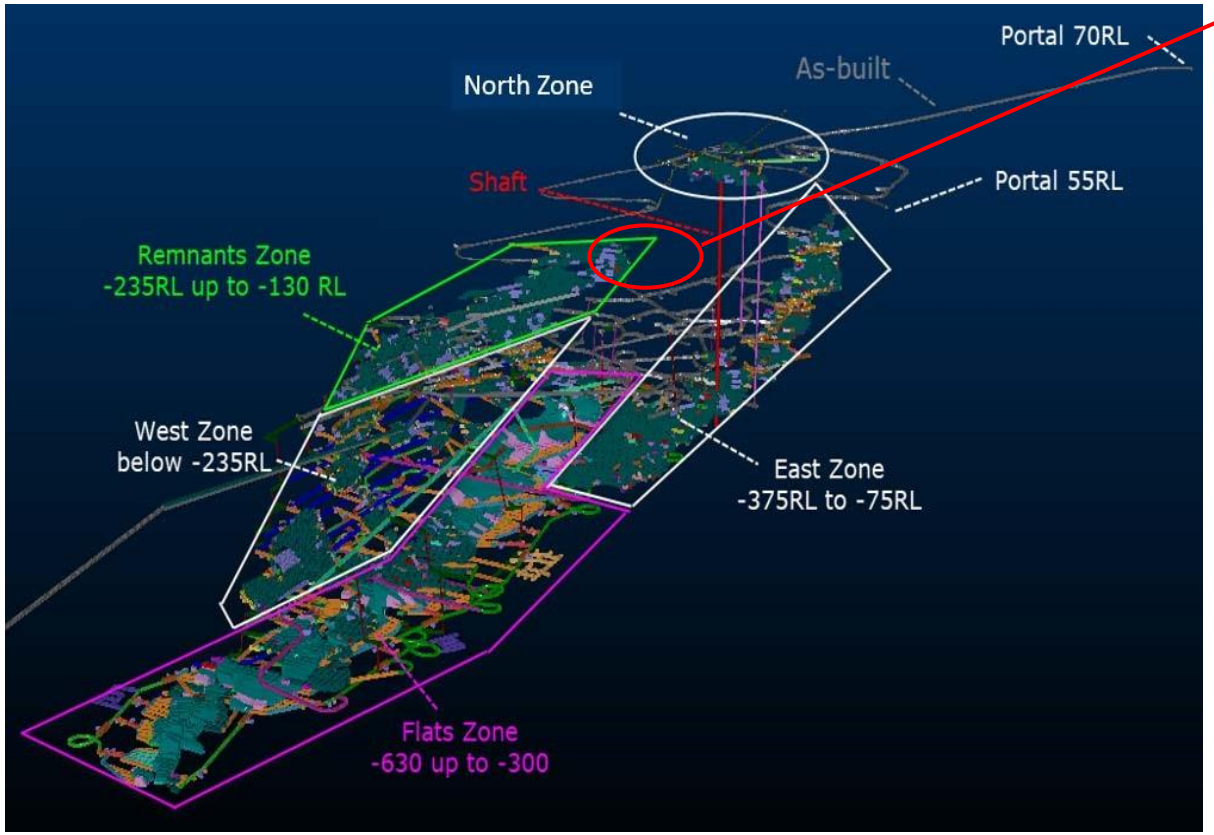


This is the location of the actual underground mining site shown in the current VE (S-W)
Latitude_40.160151,
Longtitude_23.74802

Source

Underground Structure

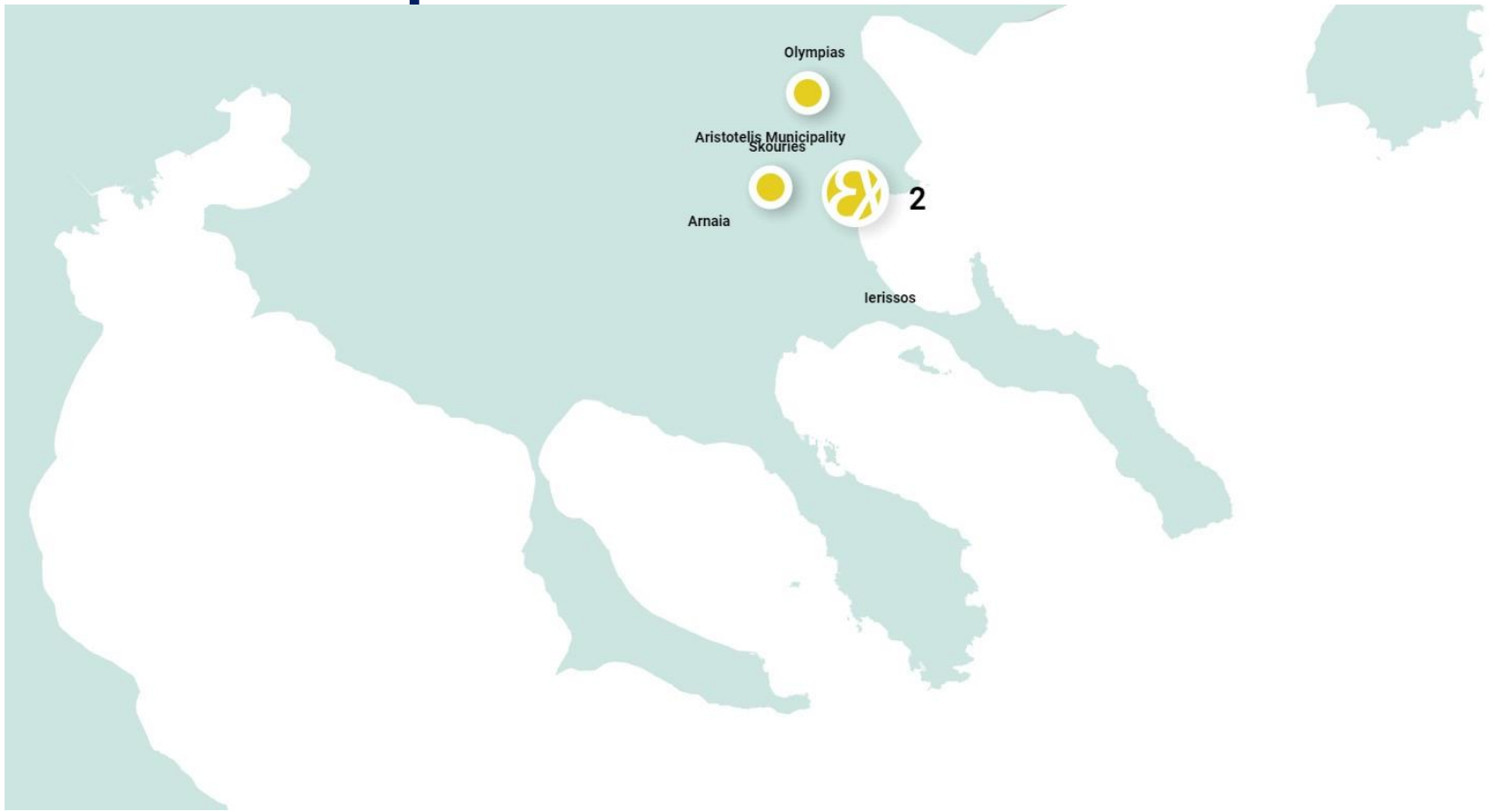
Underground Structure



Location Point 92-95 meters down

1. The green line refers to the safe zone.
2. There is an internal inclined hole that guides to the active underground mining sites.
3. There are plenty of vehicle ramps that permit delivery to the action sites.
4. The action plan of primary extraction contains diamond drilling with fresh water applying drift and fill method.
5. There is an established pipeline system for the wastewater treatment to recover contained metals. Source

Map of the Virtual Excursion



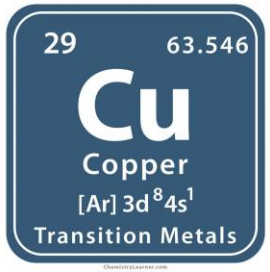
HellasGold SA_Olympias Mine Site

Latitude_40°60’ 30’’ Longtitude_23°74’ 54’’

CRMs – Arsenic (As), Copper (Cu)
Click to see Criticality Assessment of As & Cu

Supply Risk: Risk Grade of the material resources
Economic Importance: Grade of the material's price value to the market
Criticality: Grade of material's impact on the Market

CRM	Supply Risk SR	Economic Importance EI	Criticality CR
Arsenic (As)	1.9	2.9	5.51
Ranges for SR, EI, CR	0-5	0-9	0-45
Impact on SR, EI, CR (%) (Numerical Value of the CRM) ÷(Maximum Threshold)	$(SR)_{CRM} \div (SR)_{Max}$ 38%	$(EI)_{CRM} \div (EI)_{Max}$ 32%	$(CR)_{CRM} \div (CR)_{Max}$ 12.2%



CRM	Supply Risk SR	Economic Importance EI	Criticality CR
Copper (Cu)	0.1	4	0.4
Ranges for SR, EI, CR	0-5	0-9	0-45
Impact on SR, EI, CR (%) (Numerical Value of the CRM) ÷(Maximum Threshold)	$(SR)_{CRM} \div (SR)_{Max}$ 2%	$(EI)_{CRM} \div (EI)_{Max}$ 44.4%	$(CR)_{CRM} \div (CR)_{Max}$ 0.8%

Source: European Commission: Directorate-General for Internal Market, Industry, Entrepreneurship and SMEs, Grohol, M. and Veeh, C., *Study on the critical raw materials for the EU 2023 – Final report*, Publications Office of the European Union, 2023, **https://data.europa.eu/doi/10.2873/725585**

Criticality Matrix

Criticality Matrix		Supply Risk (SR)				
		1	2	3	4	5
(CR)=(EI)*(SR)						
Economic Importance (EI)	1	**(Cu=0.4)**1	2	3	4	5 **(As=5.51)**
	2	2	4	6	8	10
	3	3	6	9	12	15
	4	4	8	12	16	20
	5	5 **(As=5.51)**	10	15	20	25
	6	6	12	18	24	30
	7	7	14	21	28	35
	8	8	16	24	32	40
	9	9	18	27	36	45

- The **Criticality Matrix** displays a quantitative assessment of the Criticality grade for each examined raw material, based on the information contained in the European Study on CRMs, as shown below on this slide.
- The **Supply Risk (SR)** and **Economic Importance (EI)** refer to variable parameters that depends on the entire resources of raw materials and their configured price values according to their demand, respectively. i.e. the SR of a raw material could fluctuate within a period. Therefore, depending on the global resources data and industrial needs, the corresponding Study for CRMs could be updated, including the existing SR and EI indices for raw materials.
- The **Criticality (CR)** is configured by the multiplication of EI and SR grades. The CR index shows the criticality grade of each examined raw material.

Source: European Commission: Directorate-General for Internal Market, Industry, Entrepreneurship and SMEs, Grohol, M. and Veeh, C., *Study on the critical raw materials for the EU 2023 – Final report*, Publications Office of the European Union, 2023, **https://data.europa.eu/doi/10.2873/725585**

View of the at-site CRMs Recovery Unit after the collection of water used in diamond drilling

The Bottom slab of this area is constructed to avoid any leachates.

In the primary extraction of Arsenic, Copper and other PGMs (Silver, Gold) is used water.
The produced wastewater is transferred through a pipeline system to the water-treatment unit to recover the contained metalloids of CRMs As and Cu.
The Inflow water is enriched in metalloids of As, and Cu.
So, the metalloids are recovered and transferred to the next drying step by the high pressure of air inflowing to the deposit area and centrifugation.

Water Pipeline inflow

Pump of Air-Inflow

Disclaimer

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