Olympias

Underground Mining Site

CRM: Arsenic

Overview | CRM - As | Location
VE | Structure | VEs Map
Disclaimer

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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 using aqua-acidic reagents and catalysts.

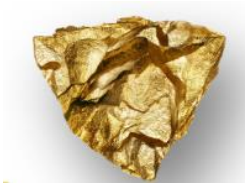
Olympias underground mining site has a depth range of 0-210m.

The 360 panoramas in the current VE refer to the southwestern active underground mining site and aim to demonstrate the macroscopic view of an actual multi-metallic sulfur ore deposit at the borehole.

Spontaneous Metals | Macroscopic View | Geotechnical Information

Images of Spontaneous Metals

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



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

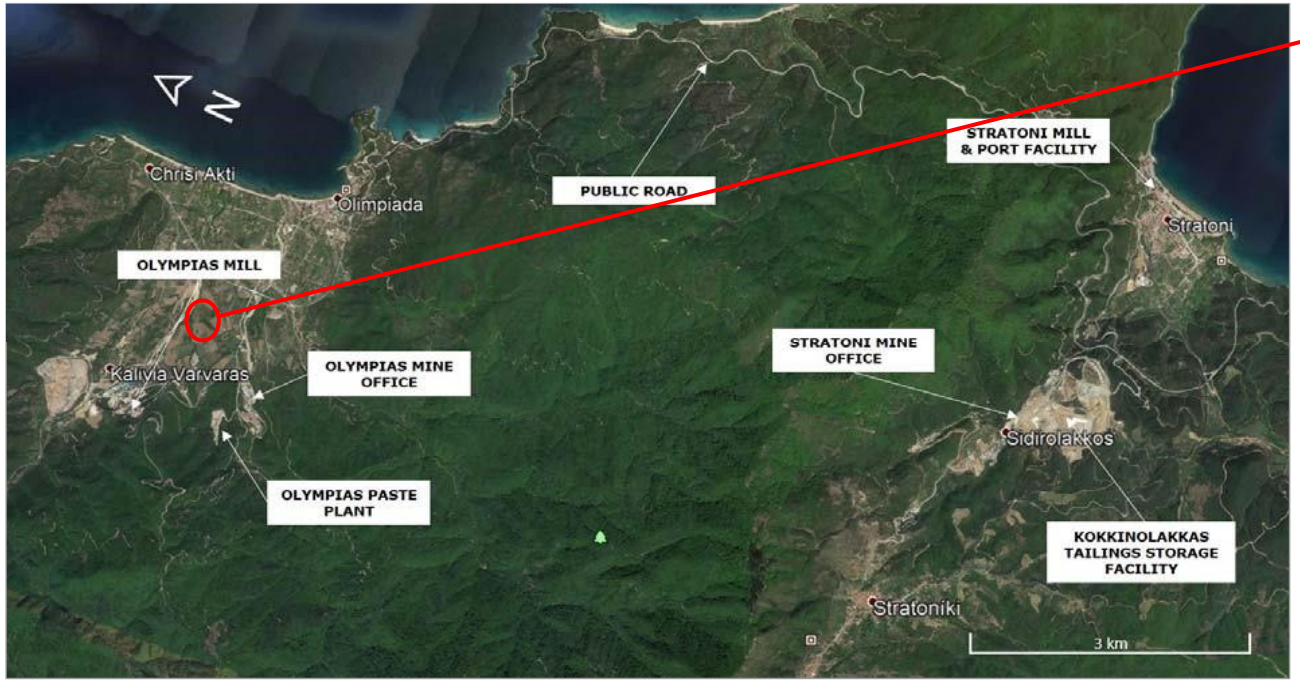
Lead (Pb)
Plumbum-Lead is well-known as a base metal. In Olympias' mine ore,
its concentration is approximately 4.16%

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

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.

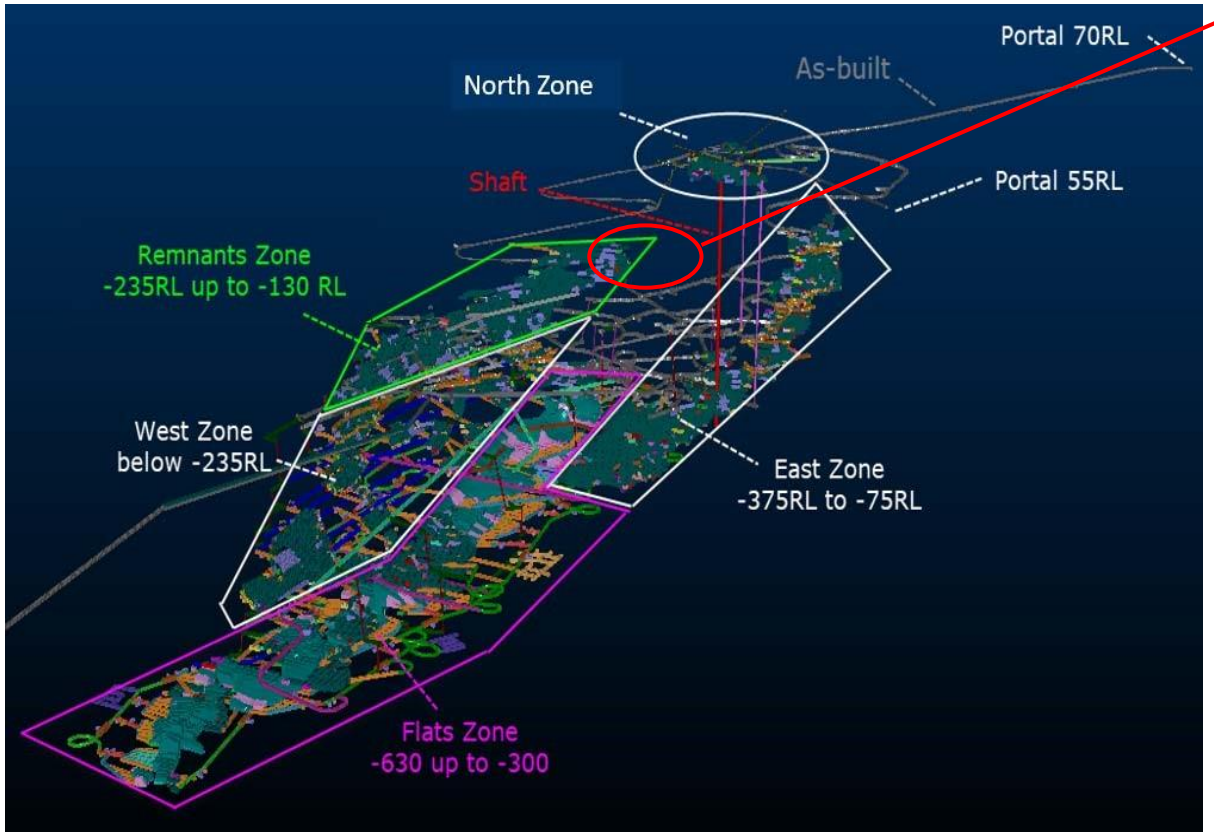


This is the location of the actual underground mining site shown in the current VE (S-W)
Latitude_40.160151,
Longtitude_23.74802

Source

Underground Structure

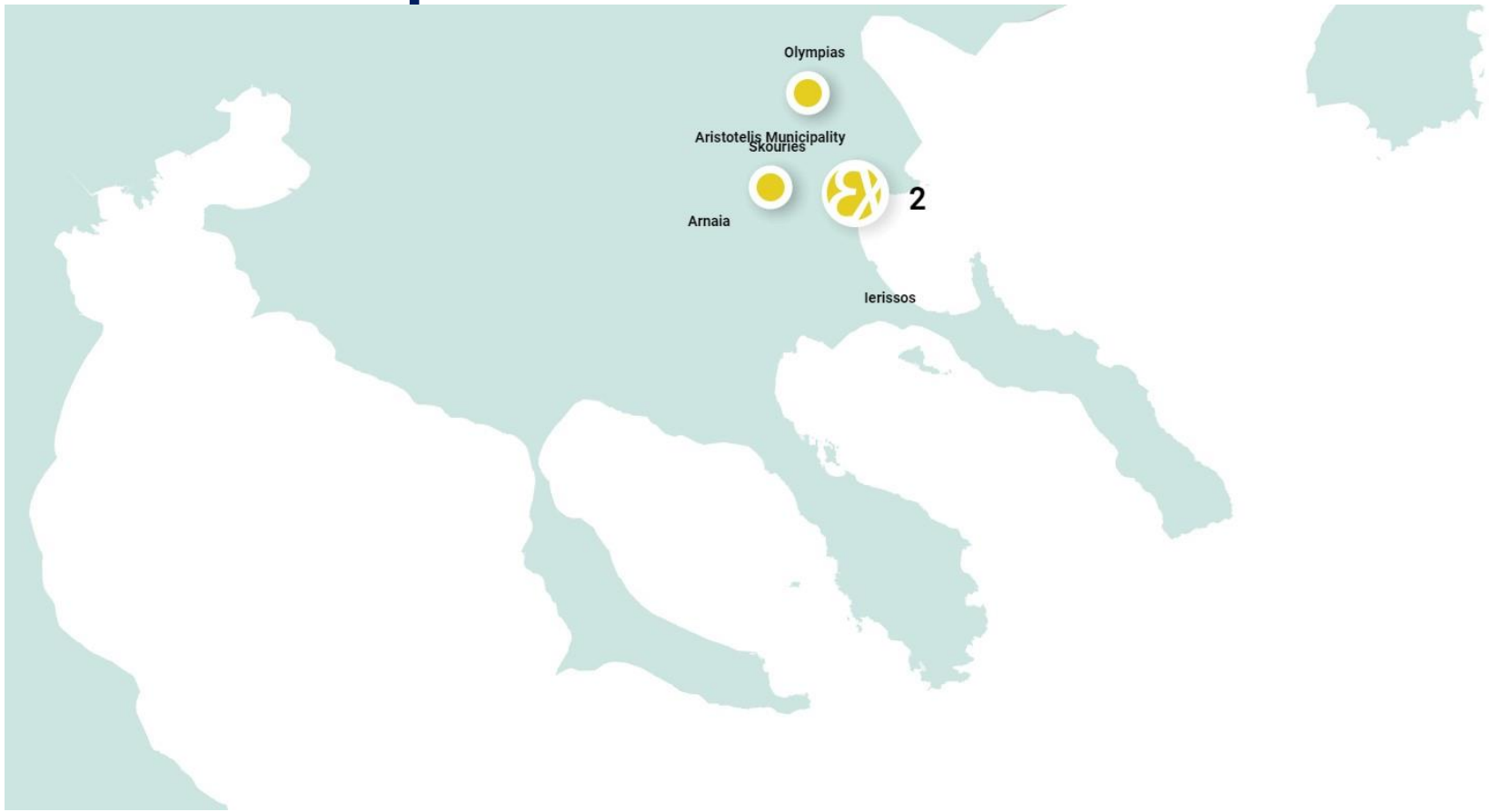
Underground Structure



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

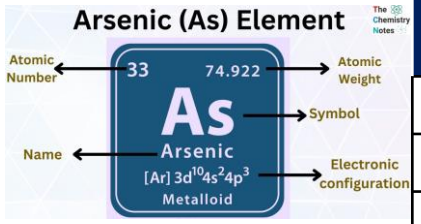
Map of the Virtual Excursion



HellasGold SA_Olympias Mine Site

Latitude:E 40° 60’21’’_Longtitude:N 23° 74’60’’

CRM – Arsenic (As)
Click to see Criticality Assessment of As



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%

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

Industrial Uses

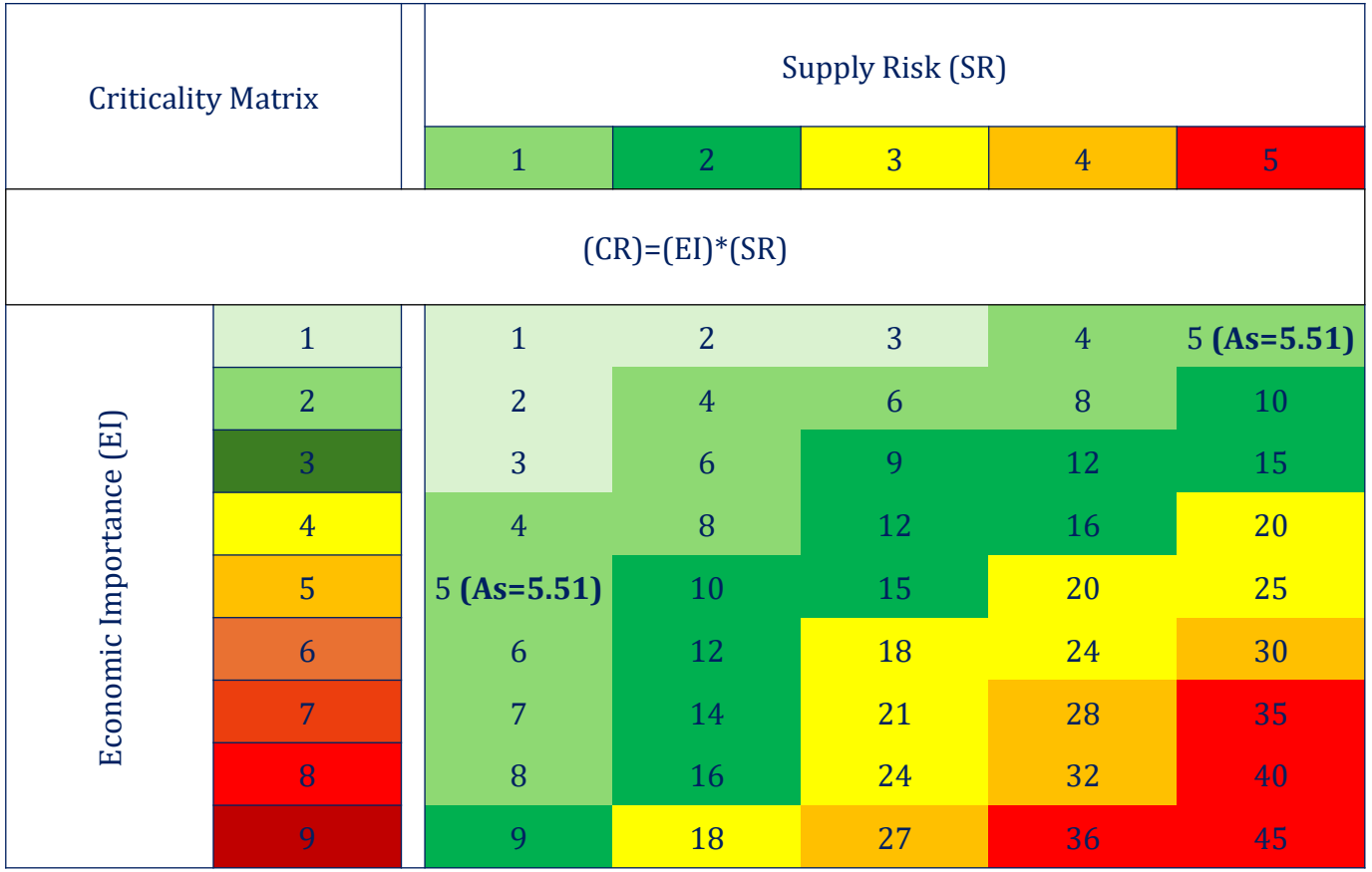
Arsenic is a critical mineral with diverse applications in advanced technologies such as:

a) solar panels
b) Telecommunications
c) Aerospace

Naturally present in rocks, soils, and water, it is often extracted as a by-product of mining metallic ores.
Despite its value, arsenic poses significant environmental and health risks due to its toxicity. Modern mining operations employ advanced technologies to prevent arsenic release, while other sources, including volcanic eruptions and industrial emissions, also contribute to environmental exposure. Meeting the rising demand for arsenic while ensuring environmental safety remains a key challenge, underscoring the need for innovative and sustainable resource management.

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

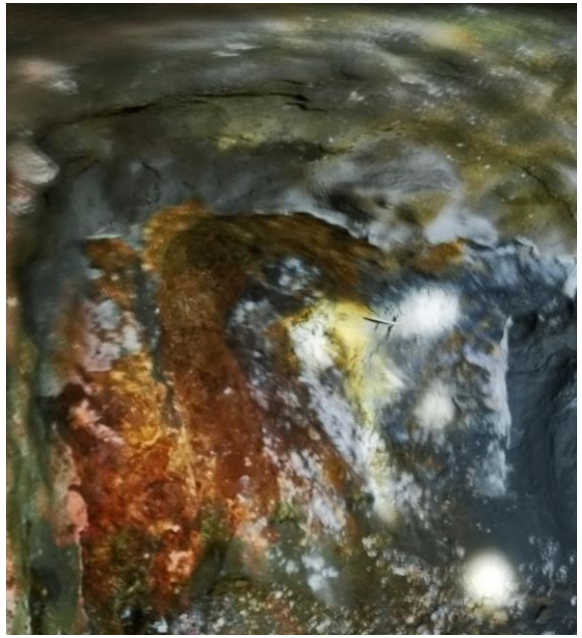


Criticality Matrix		Supply Risk (SR)				
		1	2	3	4	5
(CR)=(EI)*(SR)						
Economic Importance (EI)	1	1	2	3	4	5 **(As=5.51)**
	2	2	4	6	8	10
	3	3	6	9	12	15
	4	4	8	12	16	20
	5	5 **(As=5.51)**	10	15	20	25
	6	6	12	18	24	30
	7	7	14	21	28	35
	8	8	16	24	32	40
	9	9	18	27	36	45

- 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**

Morphology of the Multi-Metallic Sulfur Ore Deposit



The orange lava color refers to the purified sulfur soil.
The golden color refers to the widespread occurrence of sulfides in the mining ore.
Dark color refers to the occurrence of mixed Arsenopyrite, Galena, and Sphalerite.
In the mine shaft of the primary extraction, there is a high risk of falling materials; therefore, exploited procedures to construct a safe exploitation area that guides to the location of the primary extraction need to be implemented as mentioned in the Eurocode 1997-1,2 guidebook.

Click to see the construction of the exploited area in the underground Olympias Mine site

Click to see Eurocode 1997-1,2

Geotechnical Information

The borehole, where authorized vehicles move, is supported by armed concrete (*the used armed concrete in underground infrastructures contains plenty of metalloids to increase its compressive strength).
Used concrete's compressive strength is approximately 1.5 Mpa.
The red line of the constructed supporting wall over the ground level, refers to the maximum water limit permitted when diamond drilling operates.
Over this limit, there is a geotechnical hazard of soil mishaps, so in this case, there is a high risk to Health and Safety for the employees, too.

Click to see how the armed concrete is placed to support the underground mining boreholes

Click to see how diamond drilling works

Disclaimer

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