ROBOMINERS webinar

SMALL AND VERY-SMALL SCALE ROBOTIC MINING: DEPOSIT TYPES AND OPPORTUNITIES FOR EUROPE

The Jales gold mine

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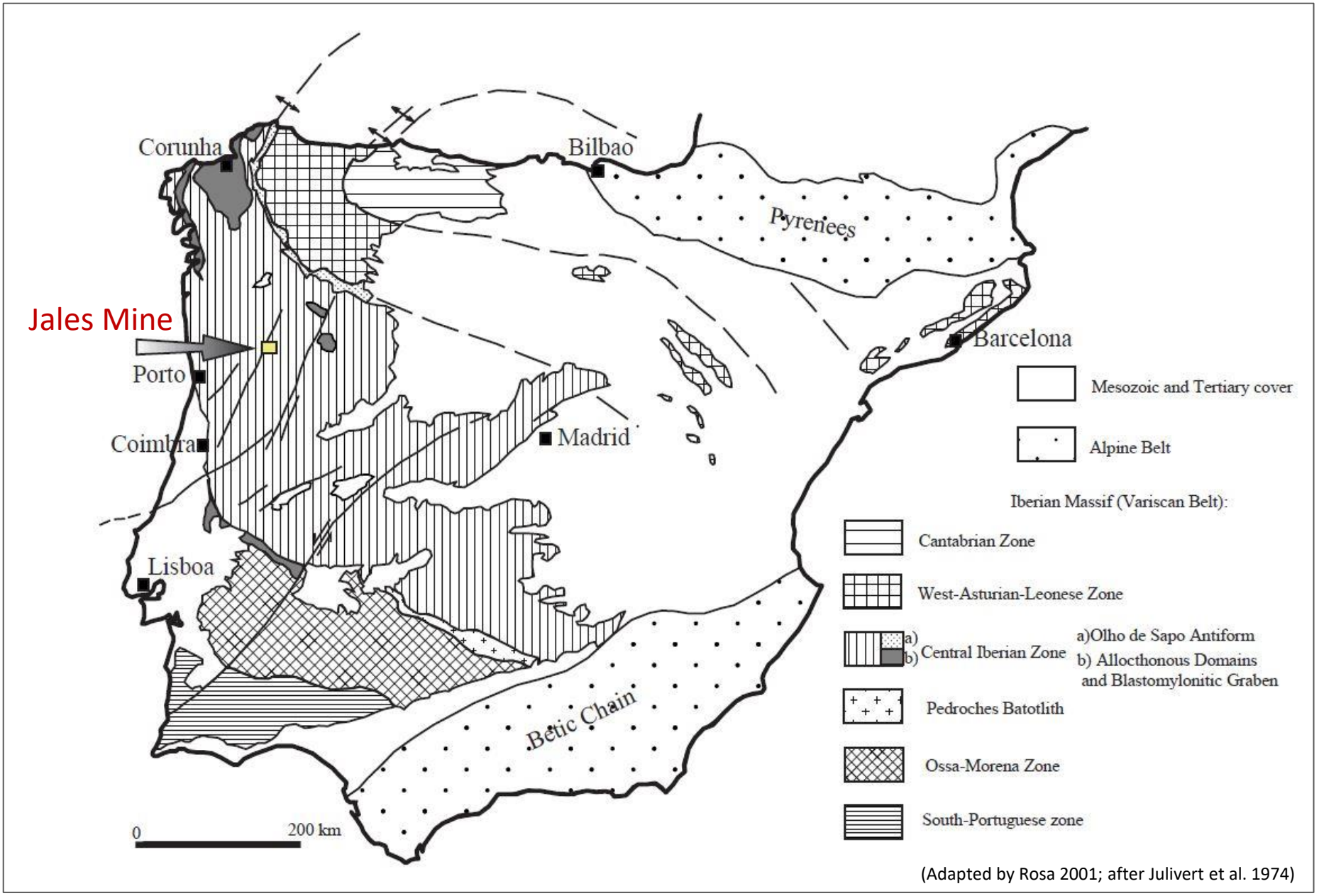
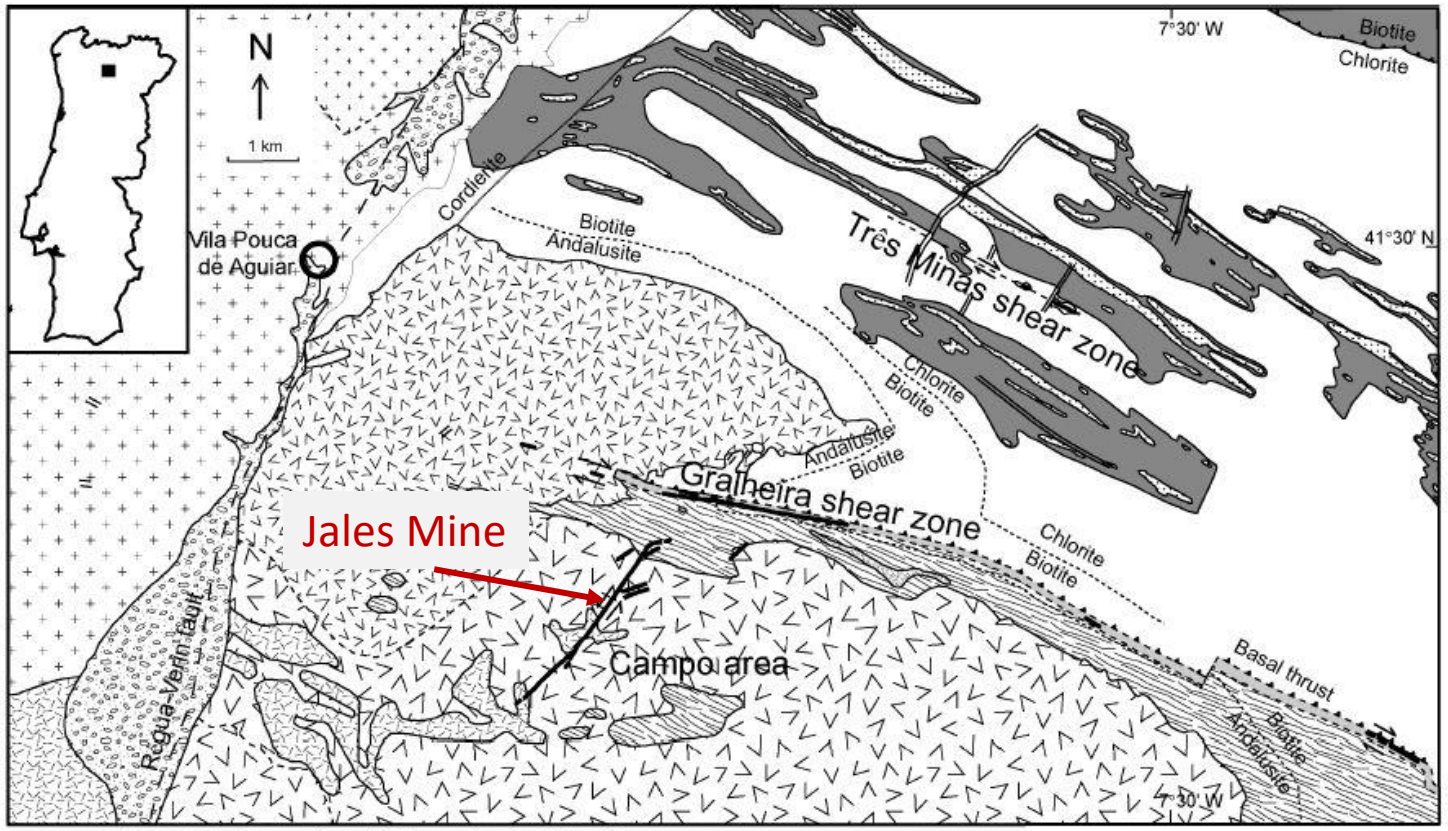
Jales Mine: Location map with main geotectonic zones of Iberia



(Adapted by Rosa 2001; after Julivert et al. 1974)

Geology map of the Jales-Tresminas gold district



(Adapted by Rosa 2001)

The Jales gold mine

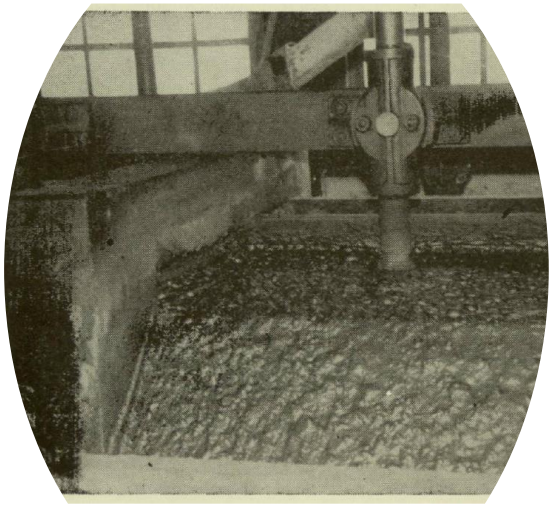
The operation

Annual Production: 37,000 ton/year

Gold Production: 225 Kg/year (7,937 oz)

Silver production: 600 kg/year (21,164 oz)

Concentrates: 1,300 ton/year



Mining Method: Cut and Fill (Hydraulic Fill)

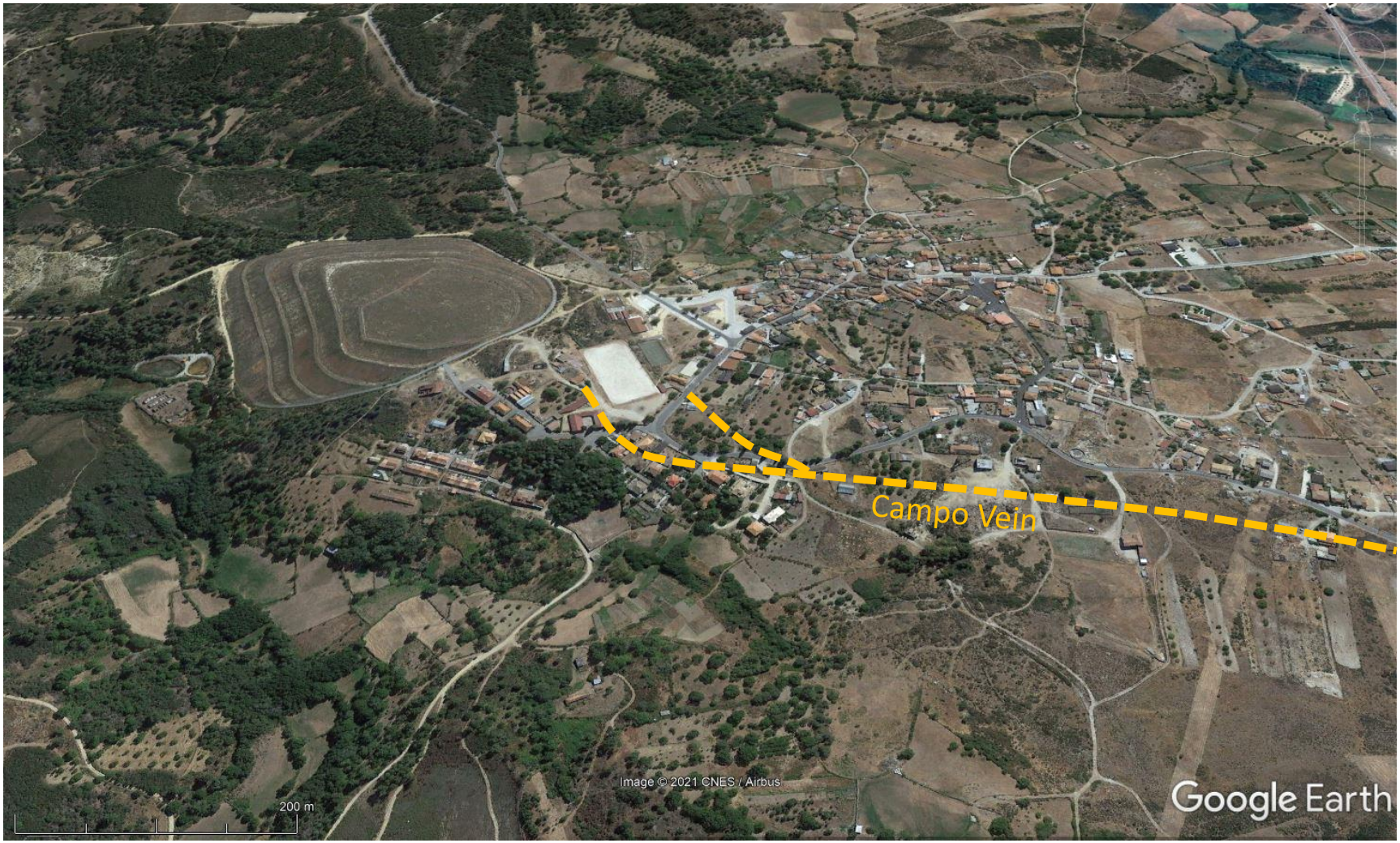
Total mine levels: 16 (620m below surface)

Historic production: Approximately 804,000 oz of Au (25 metric tons of gold & 100 tons of silver)

Roman Workings down to 130m depth

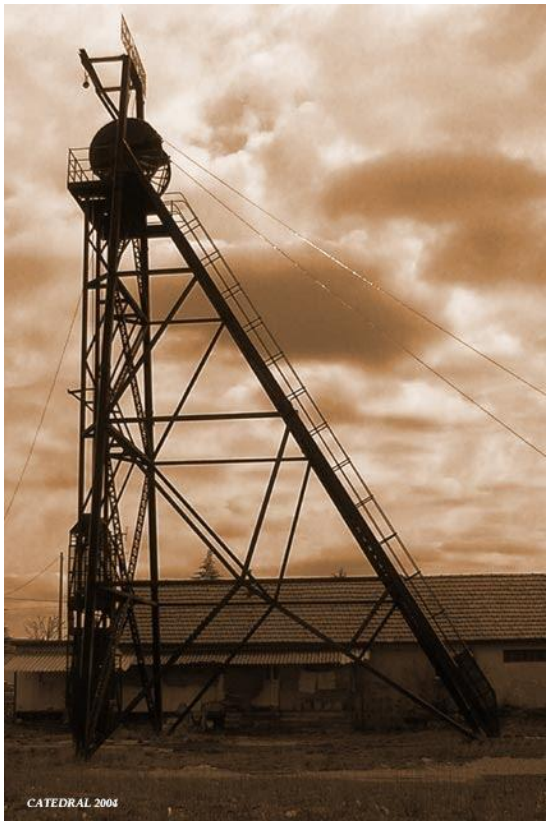
General View if the northerm part of Jales Mine

Aproximate surface projection of the Campo and Desvio veins



Why did the mine close?

- **Low Gold prices**
- **Scattering of the oreshoots at depth**
- Extraction on many faces simultaneoulsly
- Bottlenecking on haulage and transport costs
- Grade dilution
- No mechanization
- Increase on labour costs



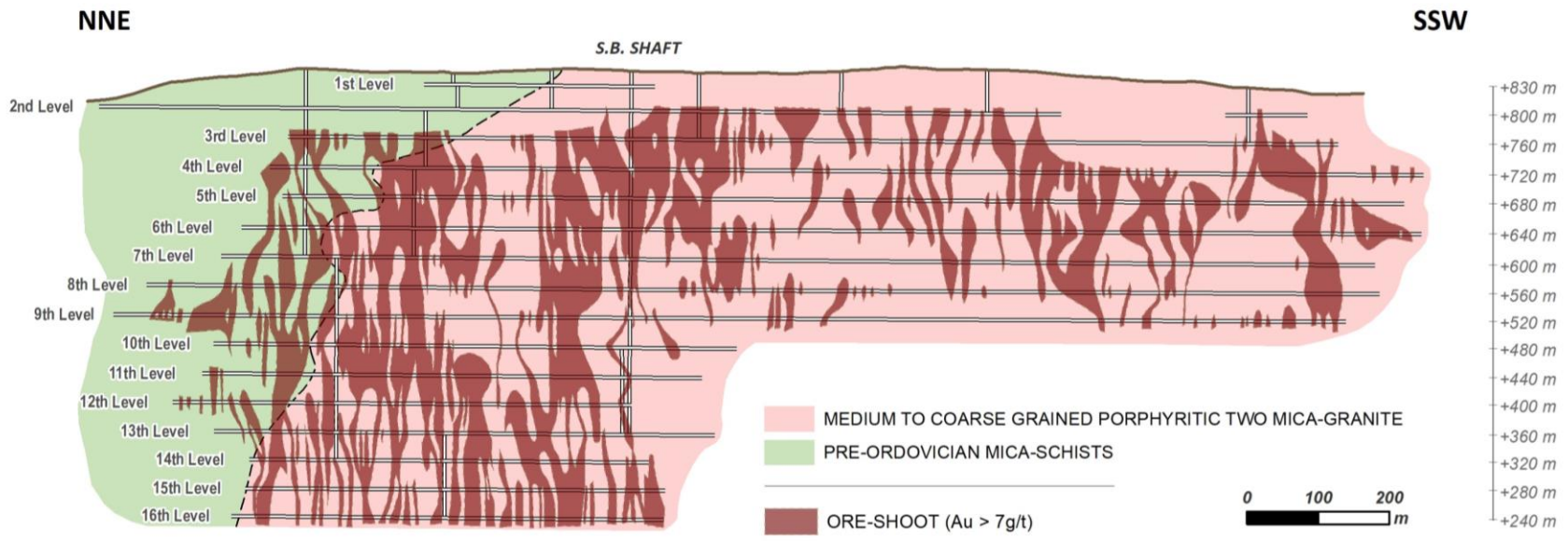
Jales Mine

Life cycle and gold prices

(Source: Macrotrends - 100 Year Historical Chart)

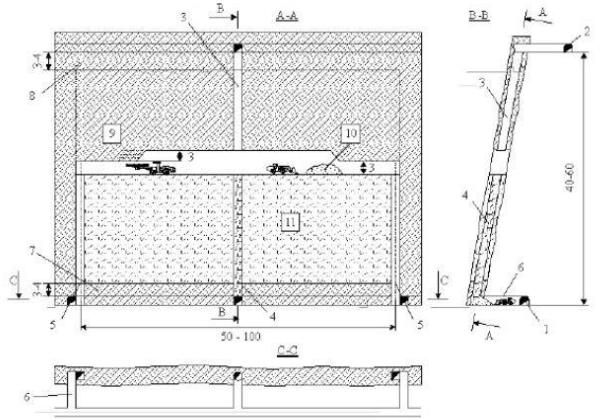
Long section with ore-shoots

Jales Mine



(Adapted from Neiva, 1990)

Cut-and-fill Stoping



1 - haulage drift ; 2 - transport drift ; 3 - rise for fill and ventilation ; 4 - ore passe ; 5 - manway rise ; 6 - crosscut ; 7, 8 - pillars ; 9 - ore ; 10 - broken ore ; 11 - backfill .

Jales Mine

The quartz vein(s):
Average Vein thickness: 0.25m
Vein grades before dilution: 20 g/t Au

Traditional mining

Mining width: 1.00m
Feed grade (last years): 5 g/t Au
Daily Production: 180 t ore
Feed grades: 5 g/t Au

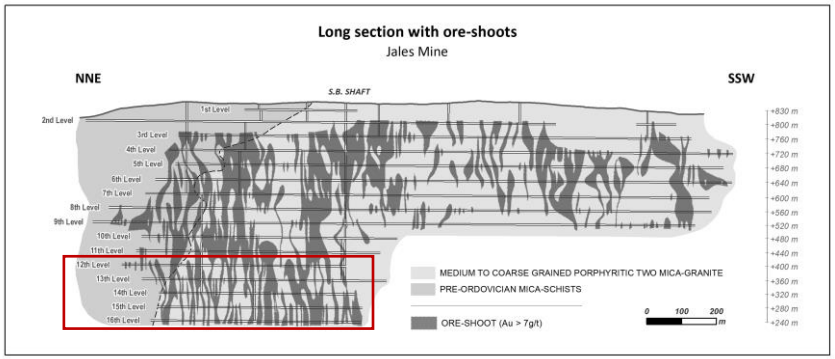
In Situ Value of ore: US$ 288,5 /t

Robomine simulation

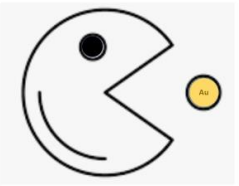
Mining width: 0.25m
Several robot units: 3-5?
Daily Production: 15 t ore
Feed grade (last years): 20 g/t Au

In Situ Value of ore: US$ 288,5 x 4 = US$ 1,154/t

Gold prices/gram = US$ 57,7
(Source: kitco.com- 16.02.2021)

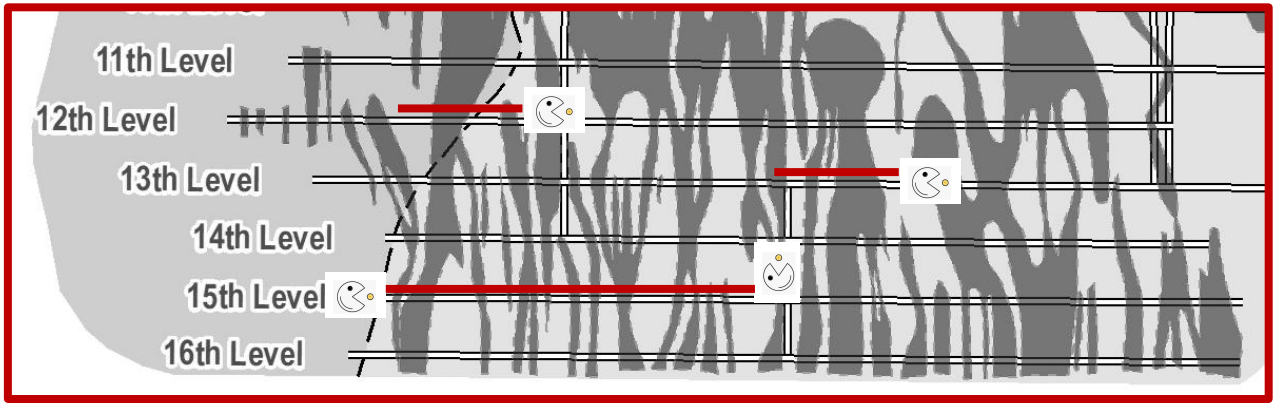


Robomine Simulation



"Stoping faces": 25cm x 25 cm

Several robot units: 3-5?

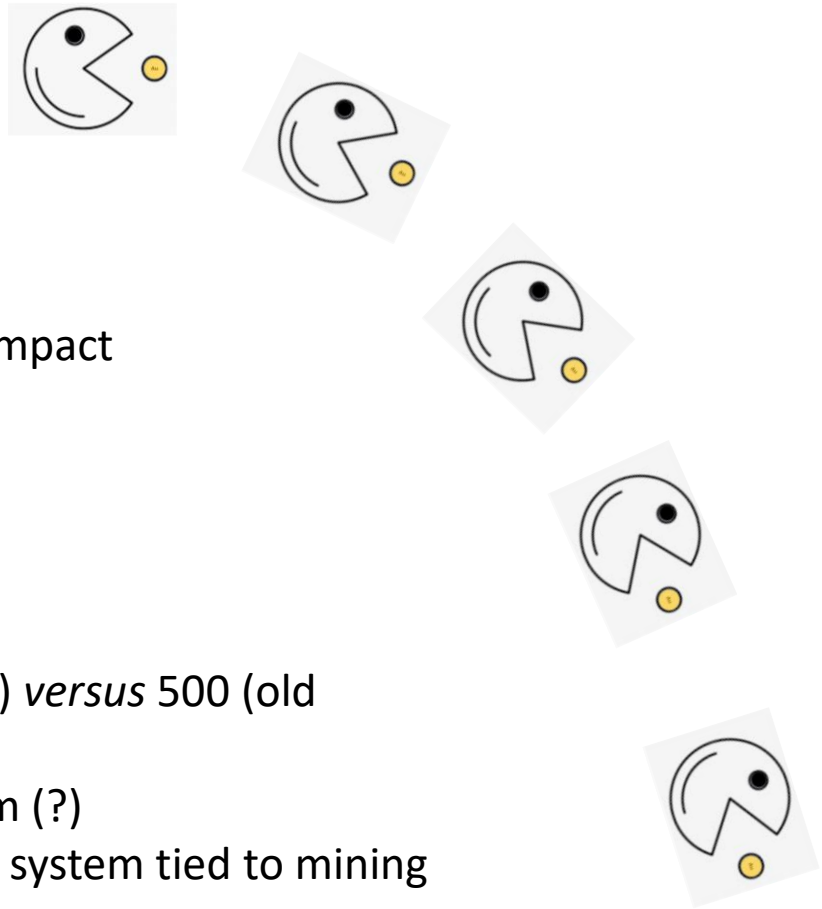


Block of 600m x 100m x 0.25m
Represents: 42.000t (2.8g/cm^3 Sp. Grav.)
Assuming 30% payable

Equates to:

12,600 t of ore
or
252 kg (8,101 oz) of contained gold
or
US$ 14.54 Million (*in situ* value)

Robomine Simulation



Opportunities:

- Low environmental & social impact
- No need for dewatering
- Reduced treatment costs
- Light infrastructure
- Improved selectivity
- Low mining costs
- Labor costs: 15 people max (?) *versus* 500 (old mine)
- “Stoping faces” : 25cm x 25 cm (?)
- Mining selectivity: navigation system tied to mining production records

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Thanks for your attention

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