

# Discovery and Development of the Haquira Cu-Mo-Au Porphyry Deposit, Peru: A Super-Giant in the Making?

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Javier Robeto, (former Project Manager, Antares Minerals), and  
the Minera Antares Peru S.A.C. Exploration Team Members



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- ~ *Disseminate Results*
- ~ *Support the Profession Globally*





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- ~ 20% Academia & Government*
- ~ 20% Students*



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*~ 6,500 Members – online directory*

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*~ Research Grants, Fellowships, Field Trips*

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- ~ SEG Traveling Lecturers*
  - ~ Distinguished Lecturer*
  - ~ International Exchange Lecturer*
  - ~ Thayer Lindsley Lecturer*
  - ~ Regional VP Lecturer*
  - ~ Honorary Lecturers*





# Regulatory Notes



Some of the statements contained in the following material are forward looking statements and not statement of facts. Such statements are based on the current beliefs of management, as well as assumptions based on management information currently available. Forward-looking statements are subject to various risks, uncertainties and other factors that could cause actual results to differ materially from expected results. Readers must rely on their own evaluation of these uncertainties.

None of the exploration properties in which Minera Antares Peru holds an interest host a known body of commercial ore and proposed programs on such properties are exploratory in nature. Development of these mineral properties is contingent upon obtaining satisfactory exploration results. Mineral exploration and development involves substantial expenses and a high degree of risk, which even a combination of experience, knowledge and careful evaluation may not be able to adequately mitigate. There is no assurance that commercial quantities of ore will be discovered on any of Antares' exploration properties. There is also no assurance that, even if commercial quantities of ore are discovered, a mineral property will be brought into commercial production.

In accordance with applicable Canadian securities regulatory requirements, all mineral reserve and mineral resource estimates disclosed or incorporated by reference in this communication have been prepared in accordance with Canadian National Instrument 43-101 -Standards of Disclosure for Mineral Projects ("NI 43-101"), classified in accordance with Canadian Institute of Mining Metallurgy and Petroleum's "CIM Standards on Mineral Resources and Reserves Definitions and Guidelines" (the "CIM Guidelines"). The terms "mineral resources", "measured mineral resources", "indicated mineral resources" and "inferred mineral resources" are recognized by Canadian securities regulatory authorities, however, they are not recognized by the United States Securities and Exchange Commission the "SEC") and the SEC does not permit U.S. companies to disclose resources in their filings with the SEC. Pursuant to the CIM Guidelines, mineral resources have a higher degree of uncertainty than mineral reserves as to their existence as well as their economic and legal feasibility. Inferred mineral resources, when compared with measured or indicated mineral resources, have the least certainty as to their existence, and it cannot be assumed that all or any part of an inferred mineral resource will be upgraded to an indicated or measured mineral resource as a result of continued exploration. Pursuant to NI 43-101, inferred mineral resources may not form the basis of any economic analysis, including any feasibility study. Accordingly, readers are cautioned not to assume that all or any part of a mineral resource exists, will ever be converted into a mineral reserve, or is or will ever be economically or legally mineable or recovered.

The Preliminary Economic Assessment ("PEA") is preliminary in nature and includes the use of inferred resources which are considered too speculative to apply economic considerations that would enable them to be categorized as mineral reserves. Mineral resources do not have demonstrated economic viability and future in-fill drilling and scoping, pre-feasibility and feasibility studies will determine what percentage of the inferred resource can be placed into the mineable category. Thus, there is no certainty that the production profile concluded in the PEA will be realized. Actual results may vary, perhaps materially. Antares is not aware of any environmental, permitting, legal, title, taxation, socio-political, marketing or other issues which may materially affect this estimate of mineral resources. The projections, forecasts and estimates presented in the scoping study and PEA constitute forward-looking statements and readers are urged not to place undue reliance on these forward-looking statements.

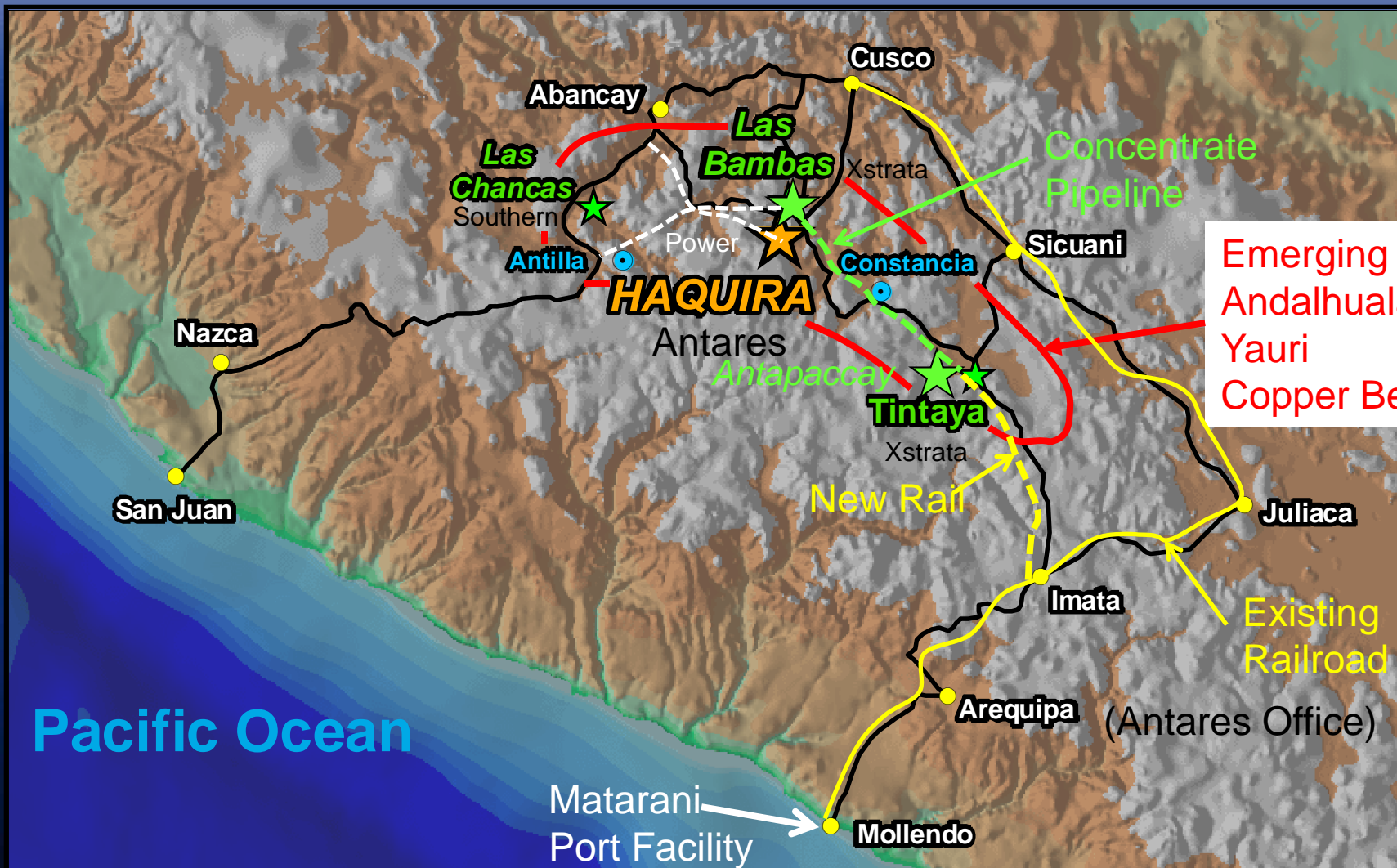




- 1) Project History & Discovery
- 2) **Deposit Geology**
- 3) Deposit Alteration & Mineralization
- 4) **Mineral Resources**
- 5) Upside Exploration Potential



# Haquira Project Location



Emerging  
Andalhuallas-  
Yauri  
Copper Belt





# Andean Community Subsistence Farming



FIRST QUANTUM  
MINERALS LTD.



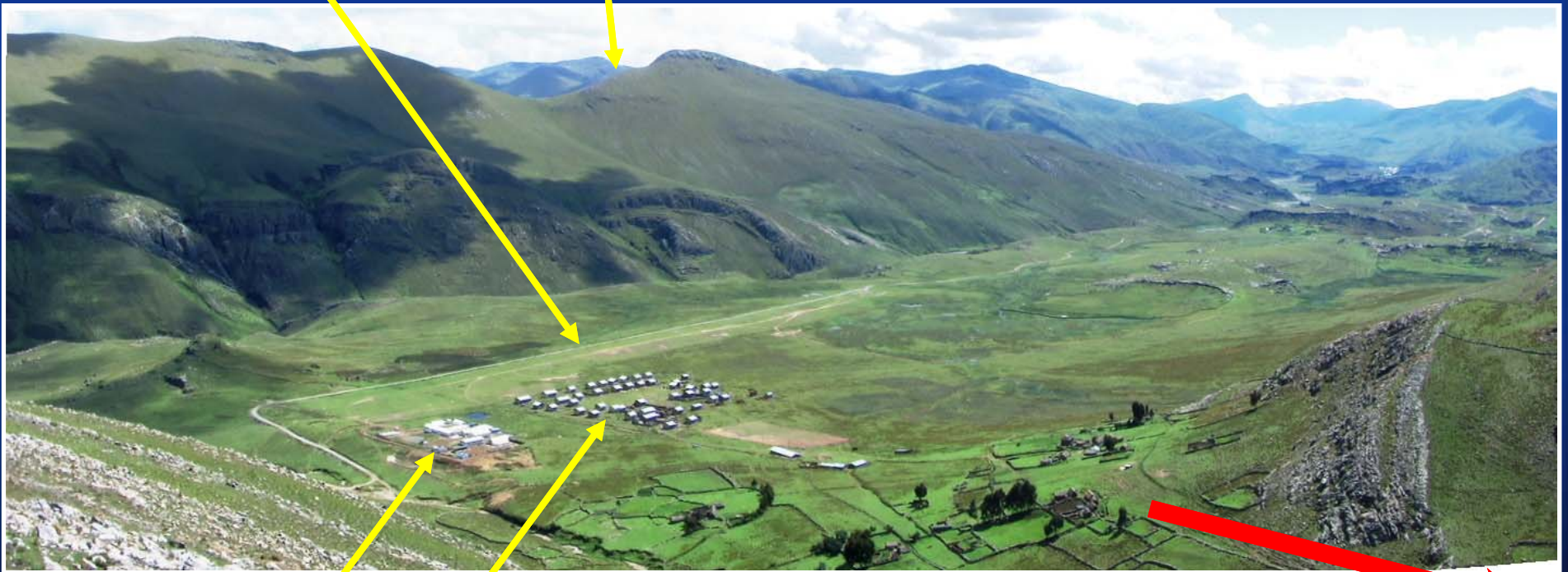
SEG Orange NSW Talk

27/06/2012





**Airstrip**  
**Las Bambas  
(Ferrobamba)**



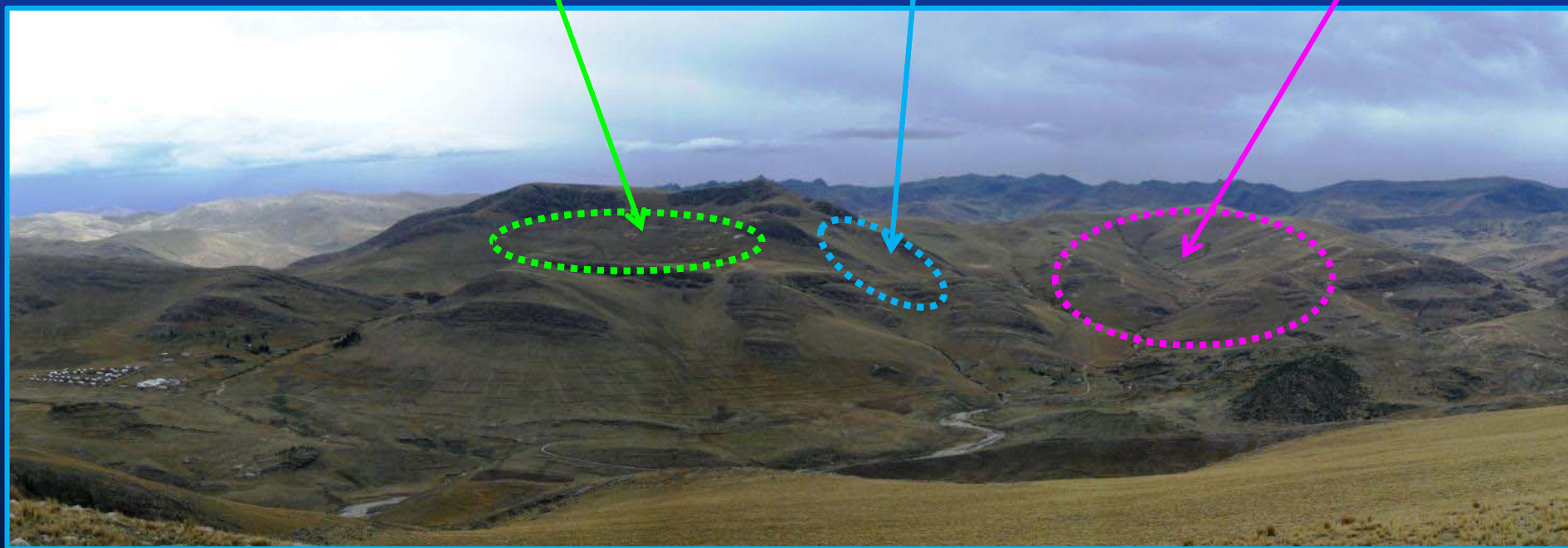
**Antares Camp**

**Huancopampa Village**

**Haquira East Deposit  
1.5 km south**



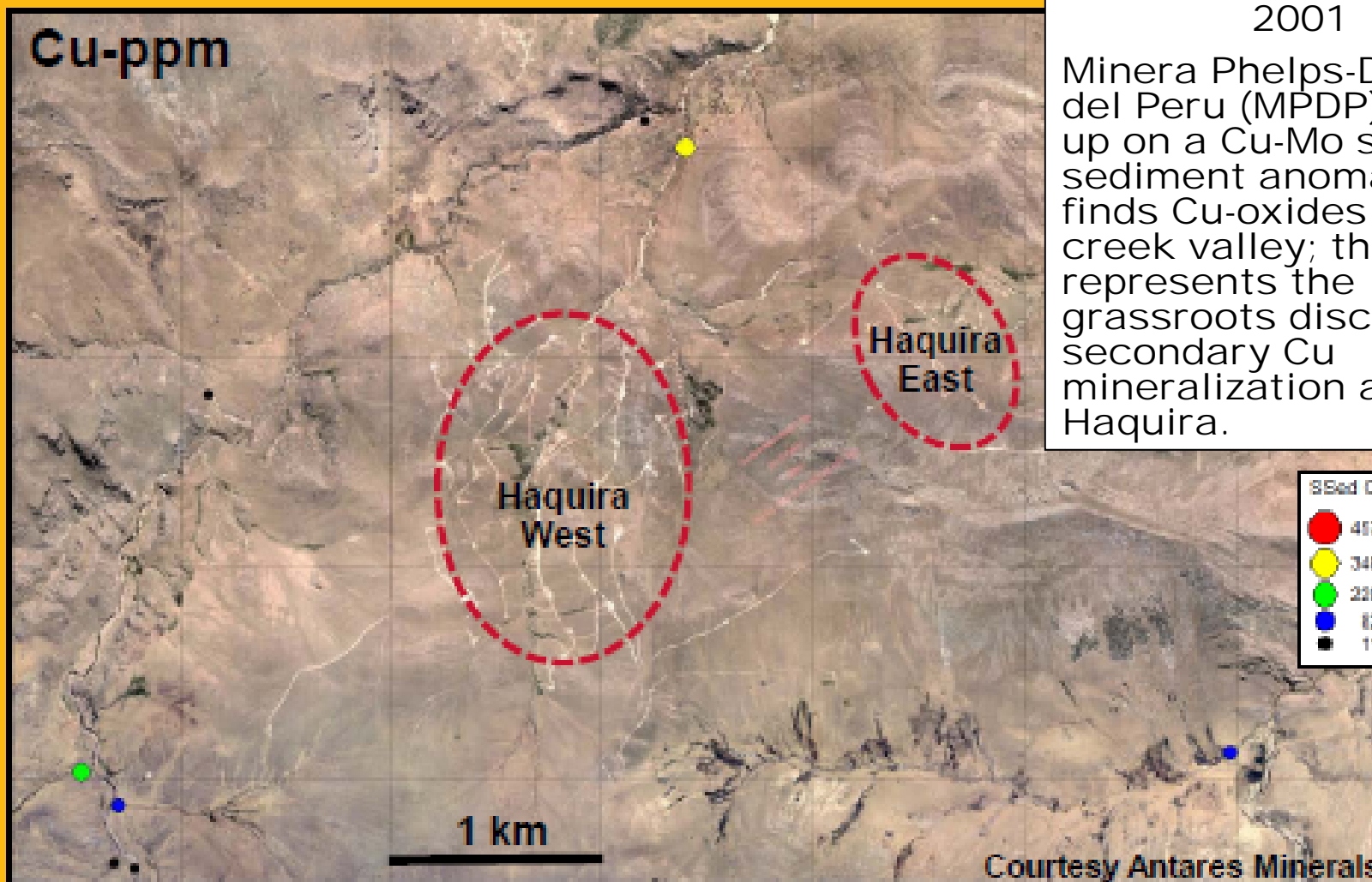
Haquira East      Potato Patch      Haquira West



View Looking South



## First-Pass Reconnaissance Stream Sediment Survey

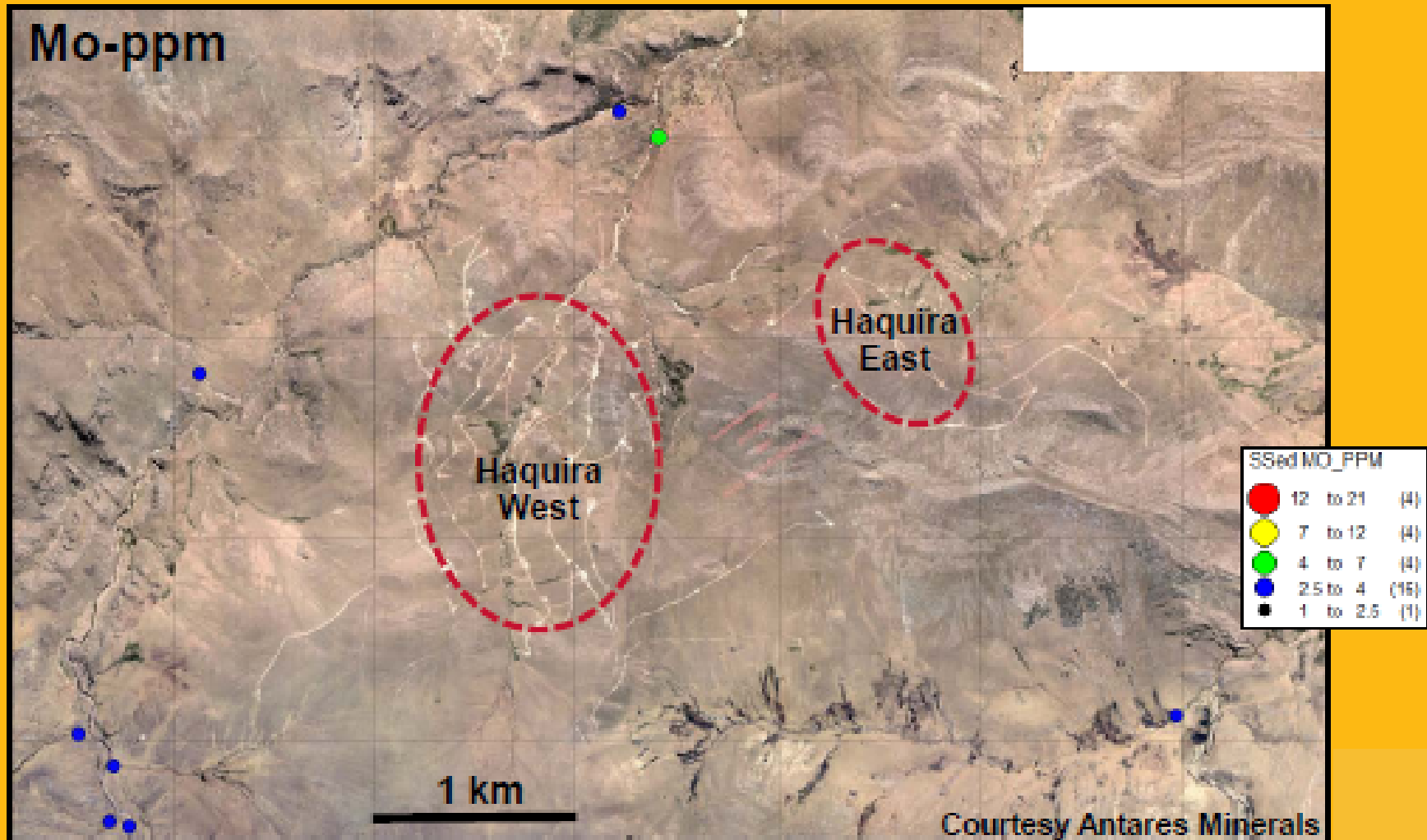


2001  
 Minera Phelps-Dodge del Peru (MPDP) follows up on a Cu-Mo stream sediment anomaly and finds Cu-oxides in the creek valley; this represents the grassroots discovery of secondary Cu mineralization at Haquira.

SSed CU_PPM	
<span style="color: red;">●</span>	417 to 621 (4)
<span style="color: yellow;">●</span>	348 to 457 (6)
<span style="color: green;">●</span>	230 to 348 (7)
<span style="color: blue;">●</span>	12 to 220 (2)
<span style="color: black;">●</span>	11 to 82 (10)

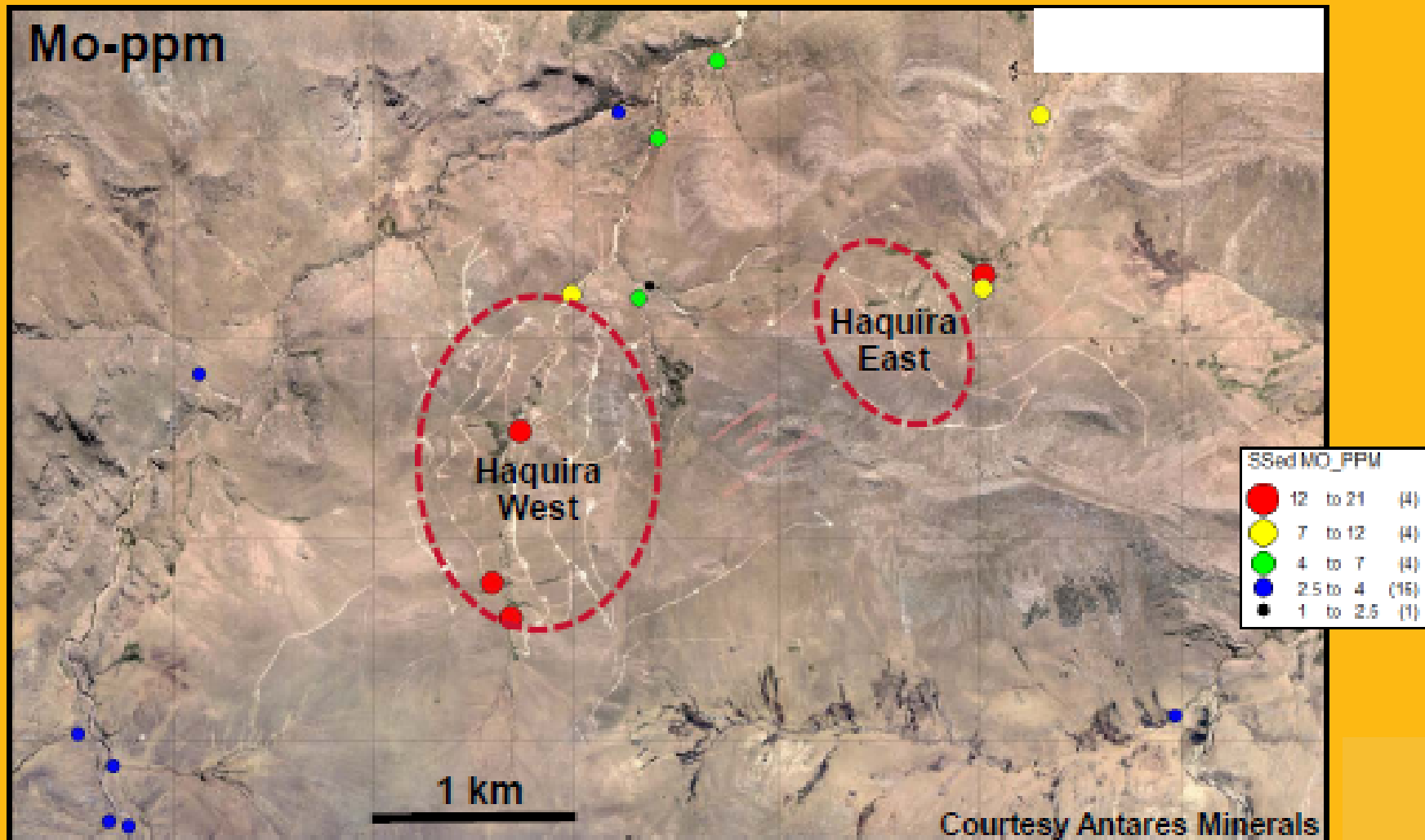
Courtesy Antares Minerals

## First-Pass Reconnaissance Stream Sediment Survey

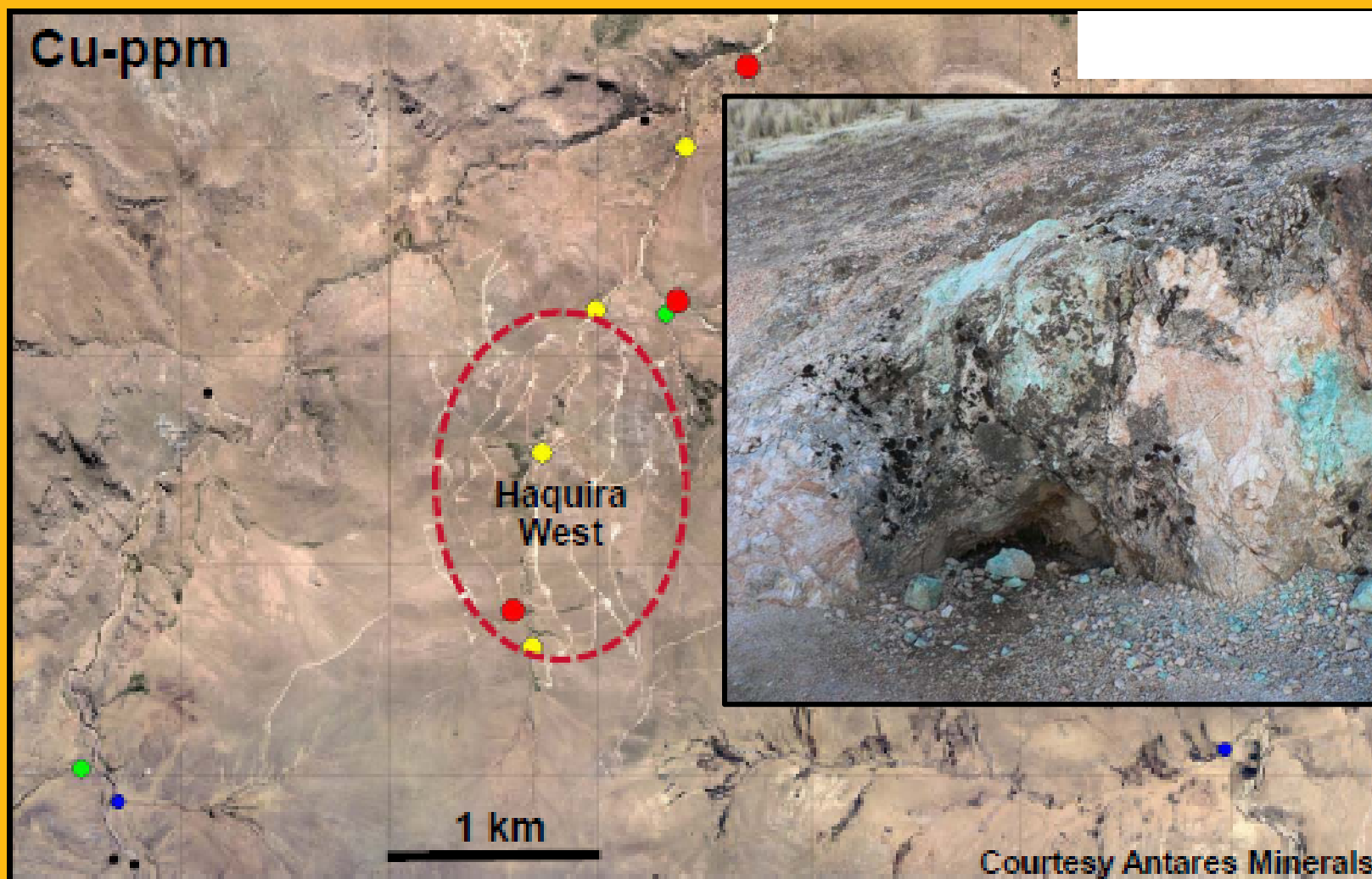




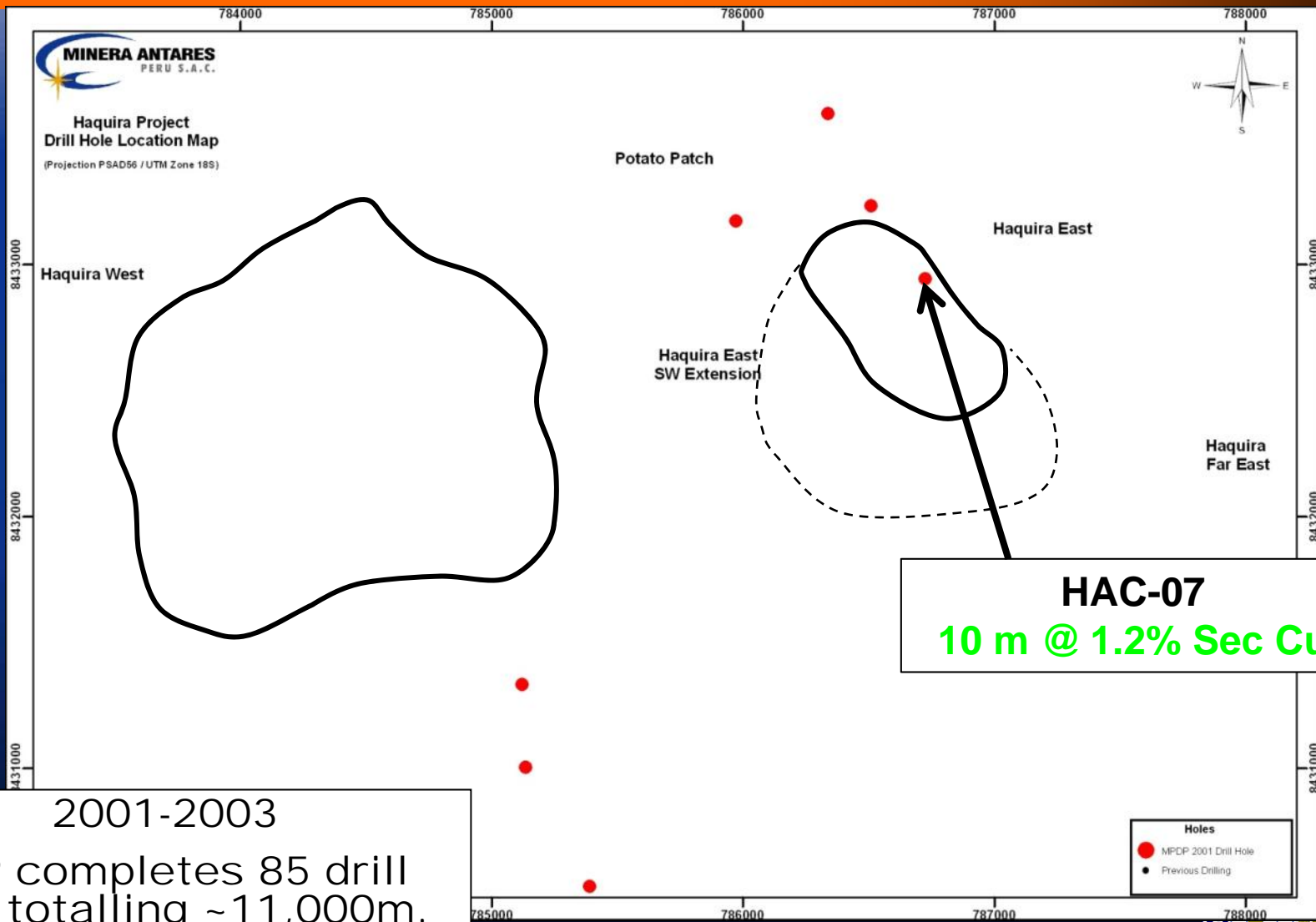
## Second-Pass Follow-up Stream Sediment Survey



## Second-Pass Follow-up Stream Sediment Survey

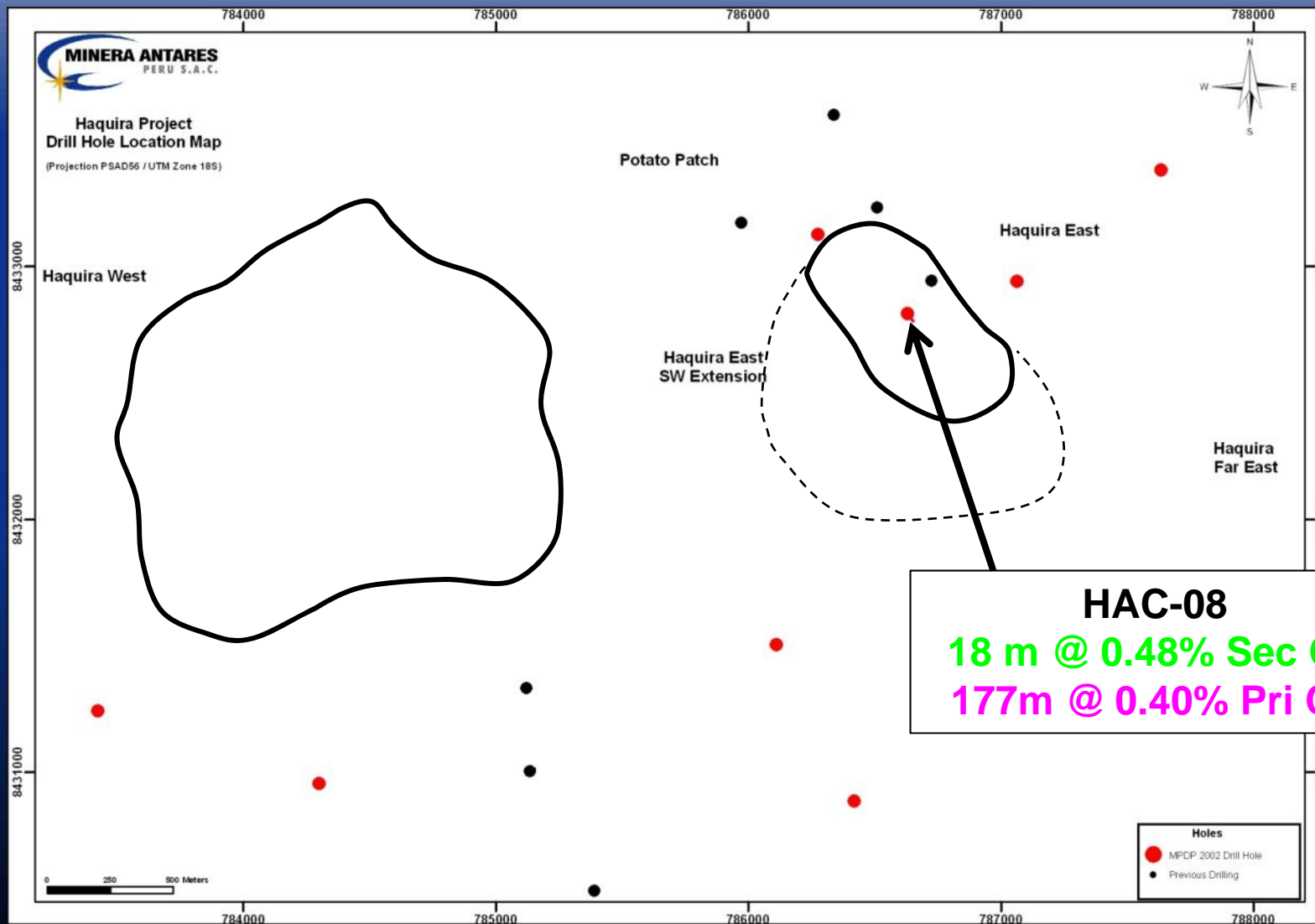




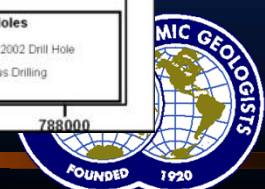


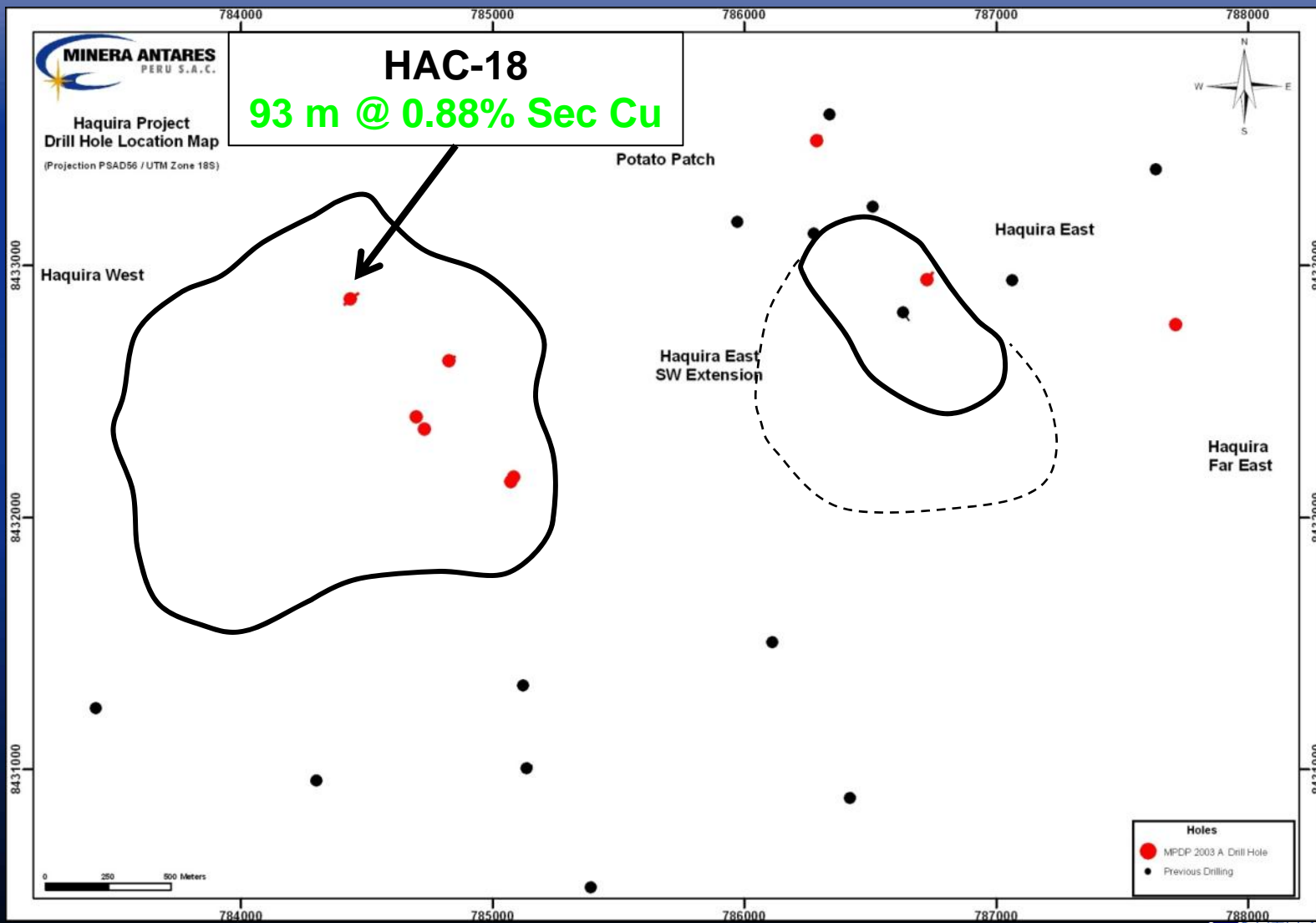
**HAC-07**  
**10 m @ 1.2% Sec Cu**

2001-2003  
 MPDP completes 85 drill holes totalling ~11,000m.

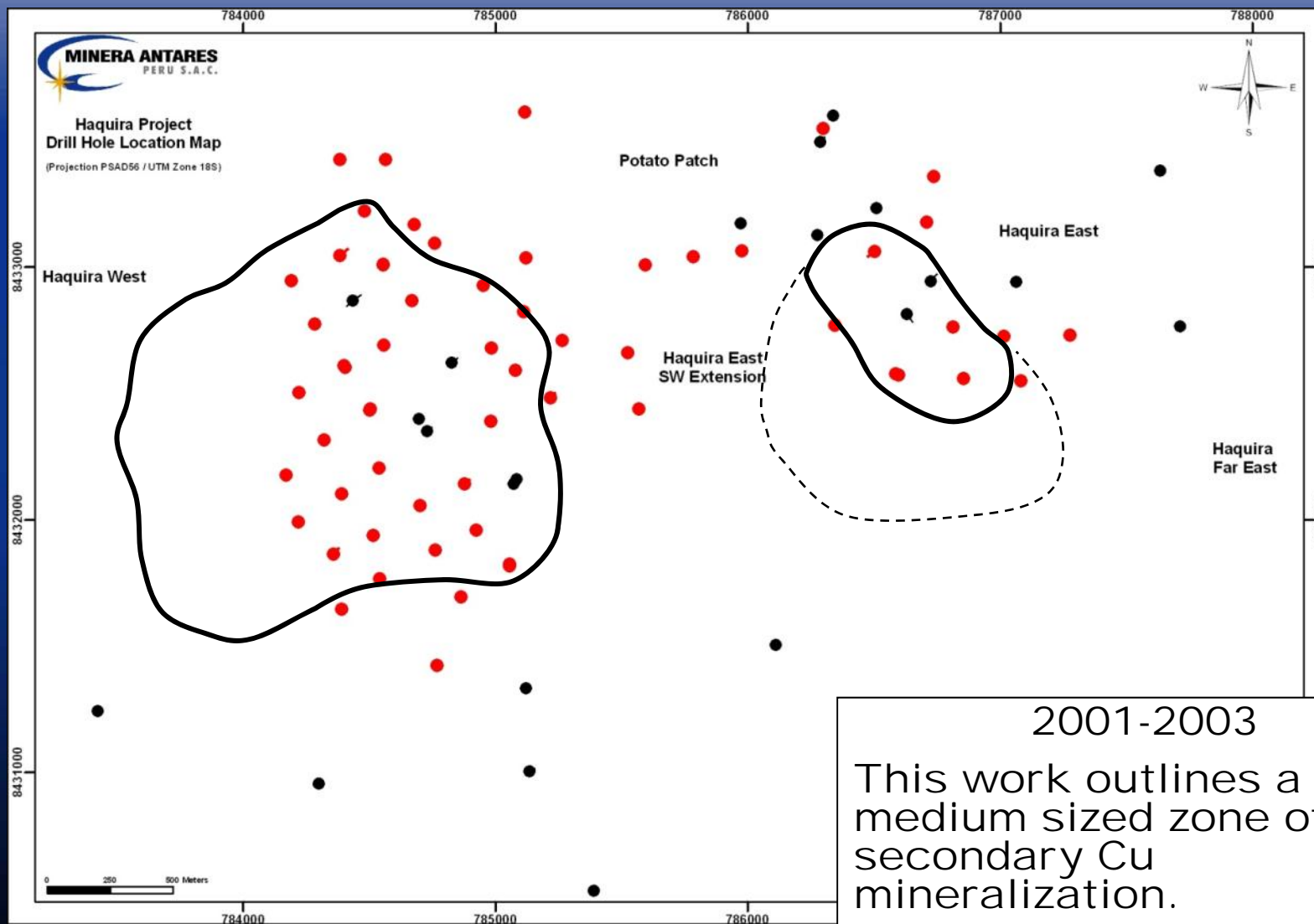


**HAC-08**  
**18 m @ 0.48% Sec Cu**  
**177m @ 0.40% Pri Cu**





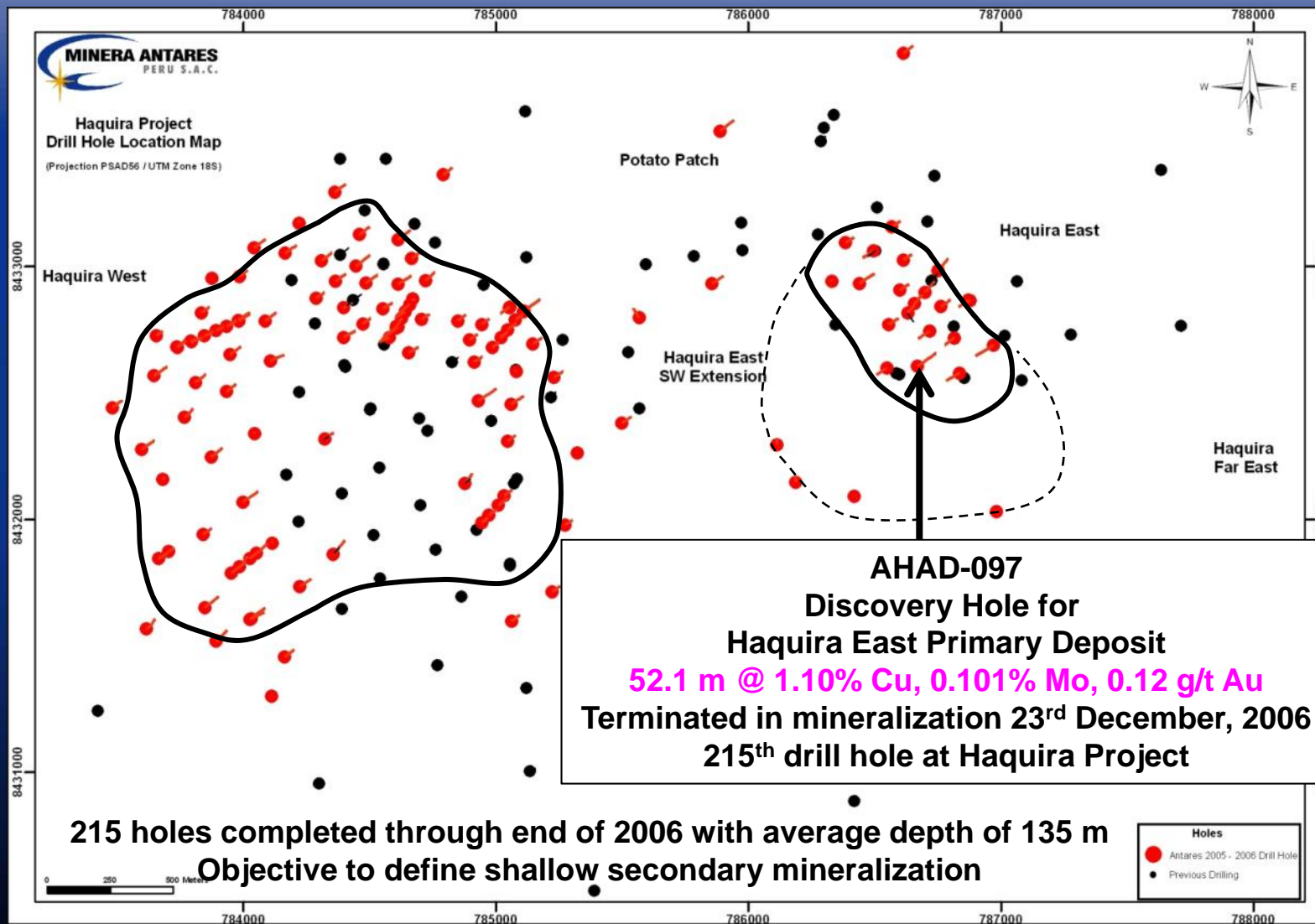




2001-2003  
This work outlines a medium sized zone of secondary Cu mineralization.

- ✦ 2004 - Planet Ventures (renamed to Antares Minerals) is formed.
- ✦ **2004 - Work starts on various projects in Argentina (including Rio Grande)**
- ✦ 2004 - CA signed with MPDP to look at Haqira data.
- ✦ **2004 - Privatization of the nearby Las Bambas project awarded to Xstrata for \$US 121 million. Antares Minerals begins 1-on-1 negotiation with MPDP to acquire Haqira.**
- ✦ 2005 - In March, Antares acquires the Haqira property in a \$US 15 million, 5-year option-to-purchase agreement (final \$US 5 million paid in March 2010).
- ✦ **2005 - Antares publishes initial resource estimate based on MPDP drilling with a total of 1.3 billion lbs of contained copper in inferred resources. ANM's initial objective is to double this resource and commences shallow drilling campaign.**
- ✦ 2006 - Antares discovers the high-grade Haqira East porphyry in late December, 2006 (52.10 m with 1.10% Cu, 0.101% Mo, and 0.12 g/t Au. Drill hole number 215 in the overall program).
- ✦ **2007 - Haqira East discovery announced in February 2007.**







## LEGEND

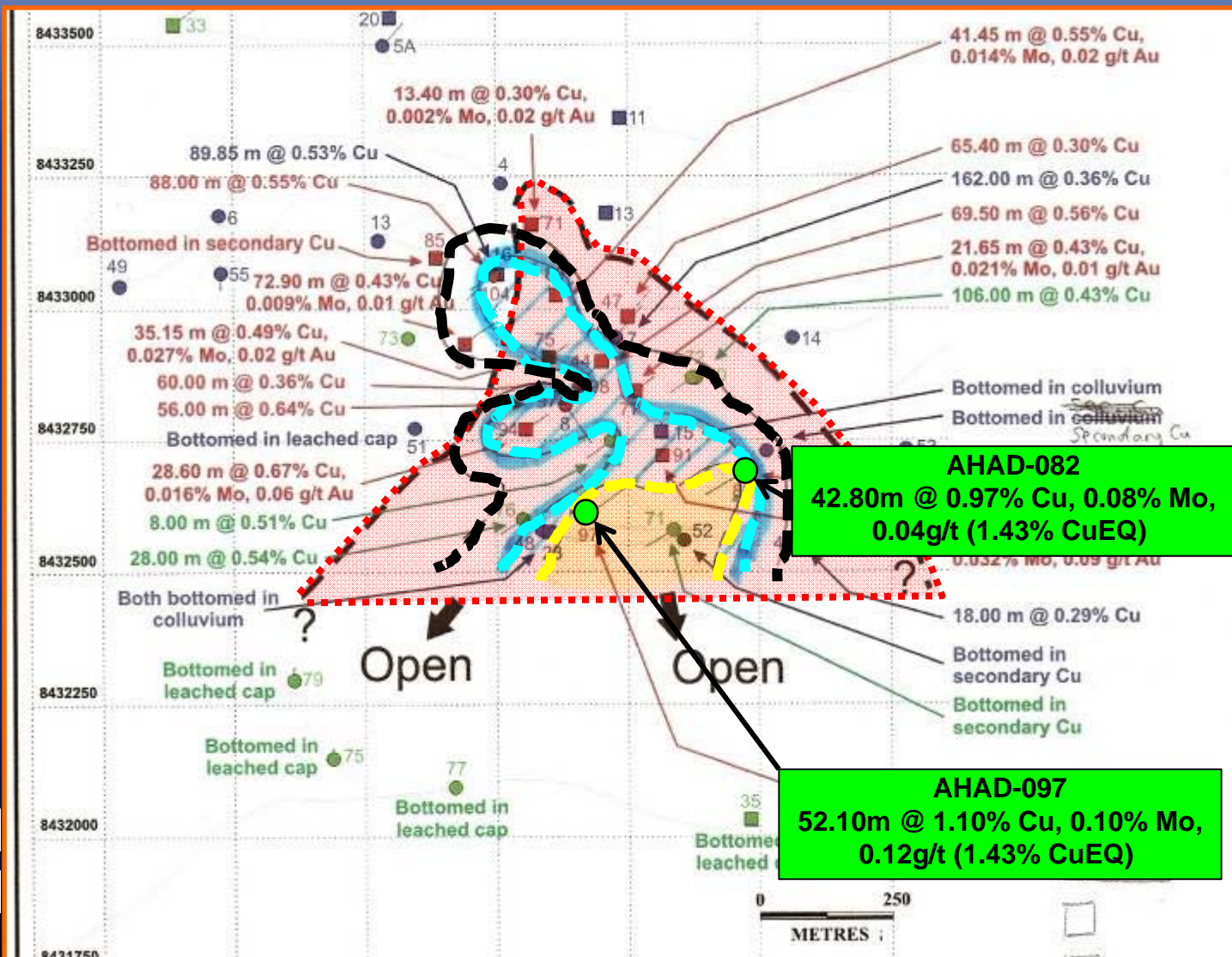
>1.0% CuT

>0.5% CuT

>0.2% CuT

Interpreted  
Porphyry  
Outline

- Bottomed in Sec Cu
- Bottomed in Colluvium
- Bottomed in Hypogene



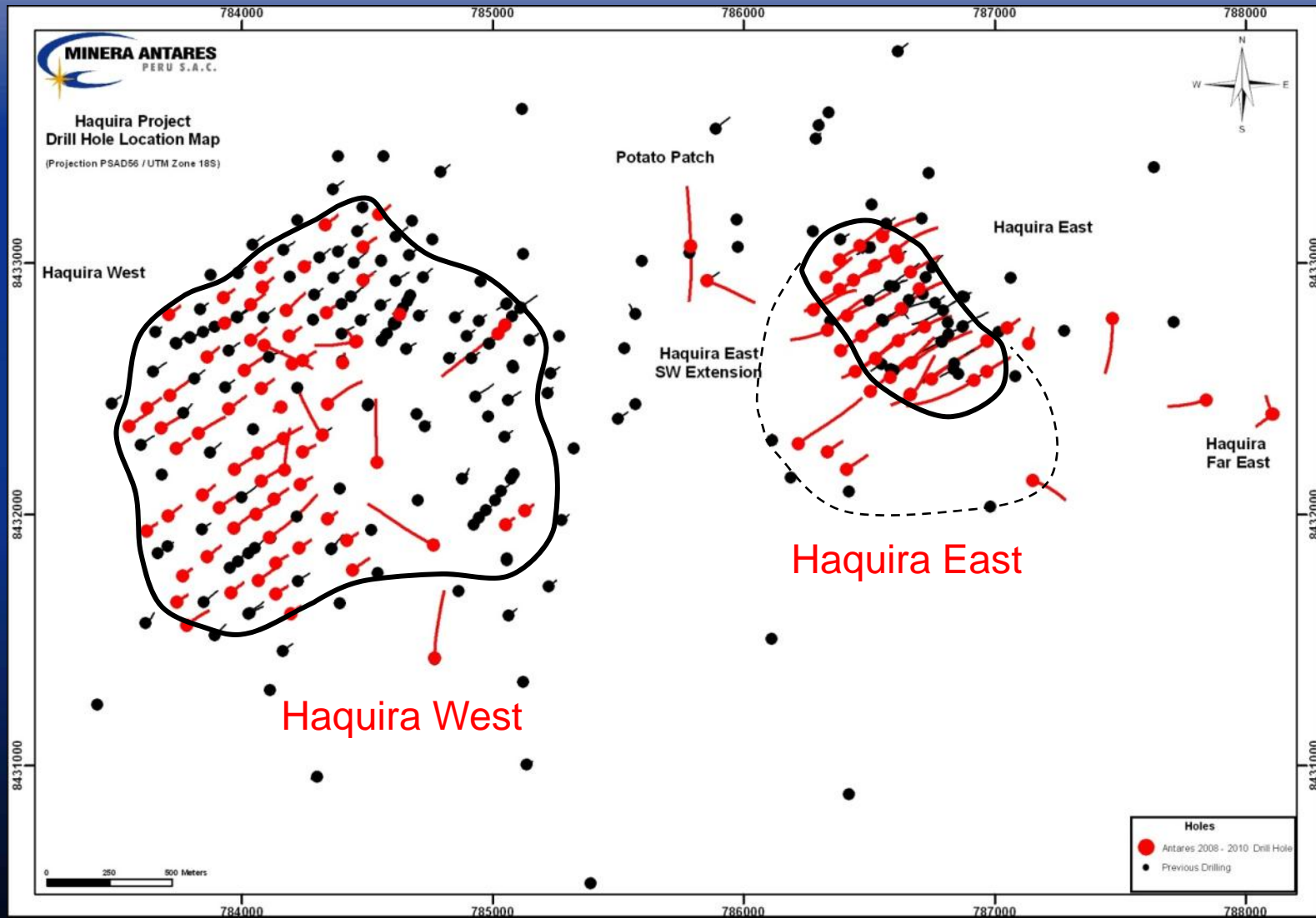
- ✦ **2007 - In July, 2007, Antares announces the 1<sup>st</sup> deep drill hole into Haqira East confirming the discovery of the high-grade primary Cu-Mo porphyry deposit.**
  - ✦ **AHAD-098A: 380.65m @ 0.67% Cu & 0.013% Mo (0.79%CuEQ)**
- ✦ **2007 - In October, Antares publishes an updated 43-101 resource of:**
  - ✦ **133.7 MT @ 0.53% CuT indicated & 43.6 MT @ 0.44% CuT inferred (leachable secondary Cu material only).**
  - ✦ **1.6 billion lbs Cu indicated and 0.4 billion lbs inferred.**
- ✦ **2008 - Antares releases positive Preliminary Economic Assessment (PEA) study for the Haqira SX-EW project (leachable secondary Cu material only).**
- ✦ **2008 - 43-101 interim resource published for Haqira East primary sulphides**
  - ✦ **Indicated 147.9 MT @ 0.57% CuT, 0.015% Mo, 0.05 g/t Au (0.71% CuEQ)**
  - ✦ **Inferred 304.6 MT @ 0.53% CuT, 0.012% Mo, 0.04 g/t Au (0.64% CuEQ)**
- ✦ **2009 - Drilling slows due to worldwide economic crises but decision made to continue working at reduced level to maintain continuity of community support. This turned out to be a key decision.**
- ✦ **2009 - Best hole drilled on the project to-date is announced in February**
  - ✦ **AHAD-159: 937.30m @ 1.14% Cu, 0.034% Mo, 0.10 g/t Au (1.42% CuEQ)**
  - ✦ **Including 331.20m @ 1.76% Cu, 0.013% Mo, 0.20 g/t Au (1.94% CuEQ)**

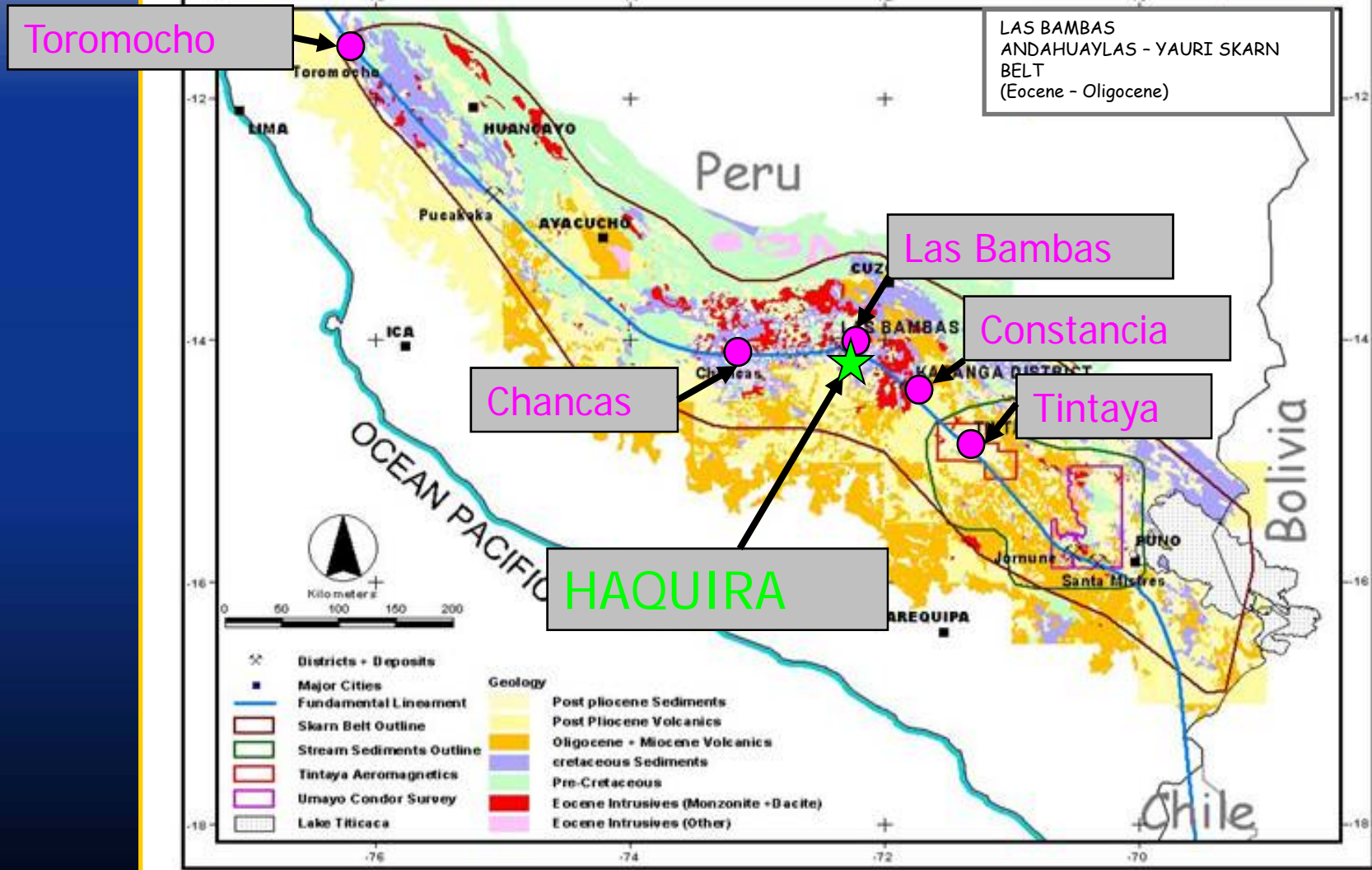


- ✦ 2010 July - Integrated Preliminary Economic Assessment (PEA) for leach/mill operation released. First look at potential for entire system very positive.
- ✦ **2010 June-September - Coverage by mining analysts increases from one to six. 12 month estimates range up to \$6.00 – increased market awareness. Increase in interest from potential partners.**
- ✦ 2010 October - Agreement announced whereby First Quantum Minerals would acquire all outstanding share of Antares Minerals Inc and thereby become the new owner of Minera Antares Peru S.A.C. and the Haquira Project.
- ✦ **2010 December - Sale agreement with First Quantum Minerals finalized for ~\$CDN 650 million.**
- ✦ 2010 December - Regulus Resources Inc (REG.V) created as a Spinco to hold the Rio Grande Project in Argentina – First Quantum owns 9.9% of Regulus. We look to repeat the same pattern with Regulus that we managed with Antares.
- ✦ **2011 - First Quantum Minerals continues drilling and exploration**



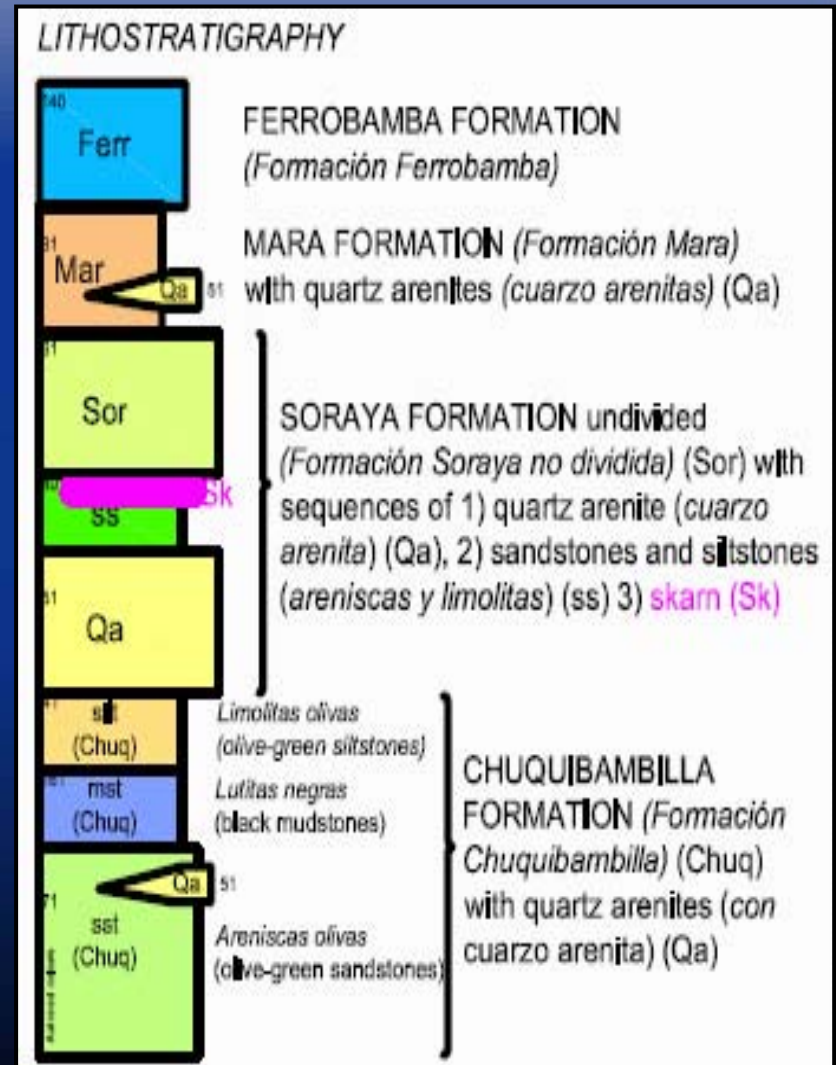






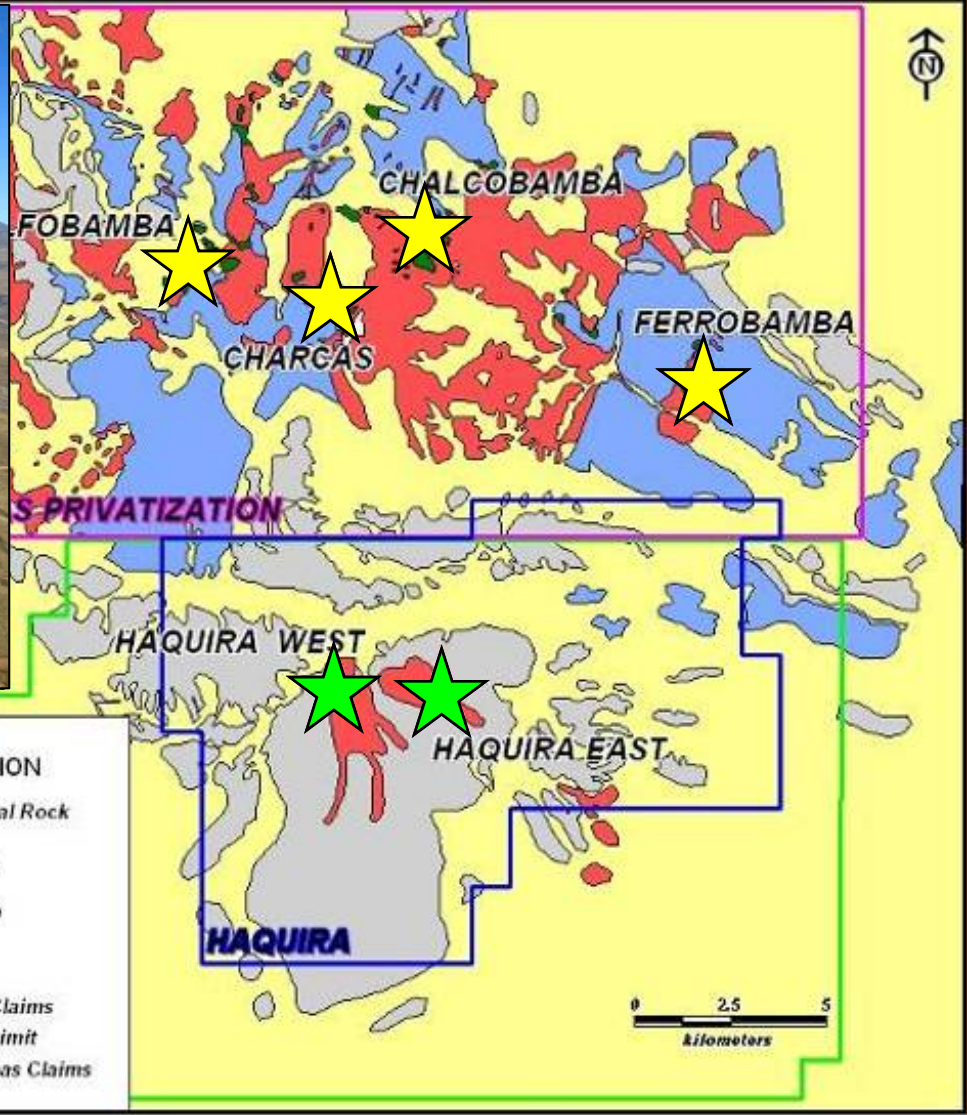
## ★ 3 major sedimentary stratigraphic units

- Ferrobamba Formation (not present)
  - Limestone sequence; Las Bambas & Tintaya skarns
- Mara Formation (youngest)
  - Red-bed sequence
- Soraya Formation (middle)
  - Quartzites and intercalated fine-to medium-grained, locally calcareous sedimentary rocks
- Chiquibambilla Formation (oldest)
  - Fine-grained black shales and siltstones with local syngenetic pyrite





# Simplified District Geology



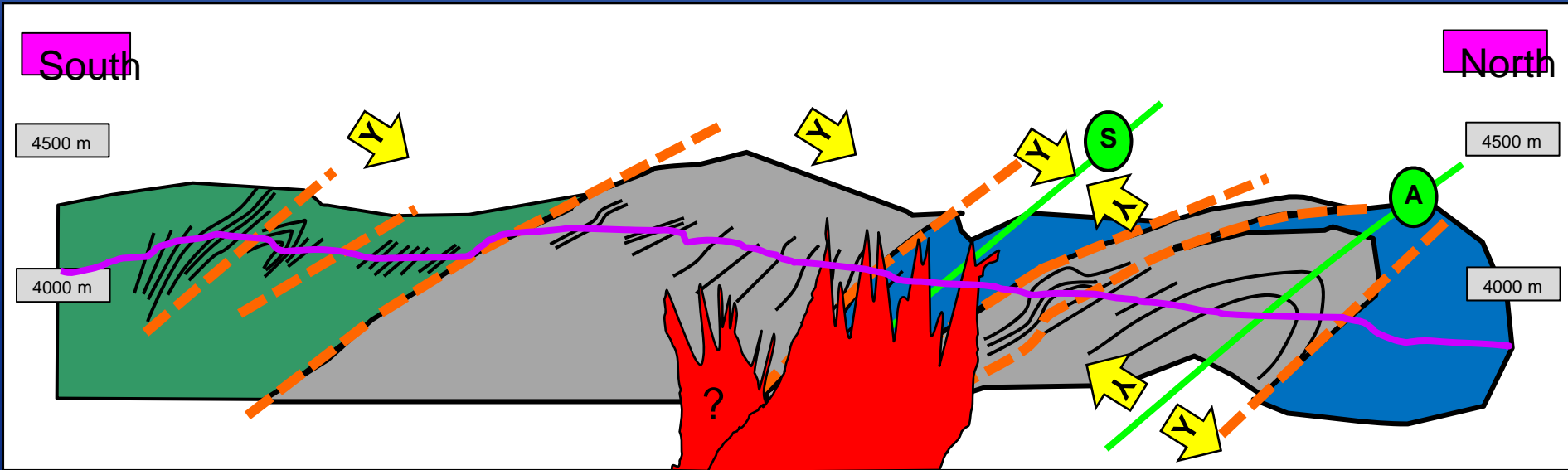
Las Bambas Global  
1.55 bt @ 0.61% Cu  
(Dec 2010)

Haqira Global  
975 mt @ 0.55% Cu  
(Feb 2010)





## SECTION 785500E (Haquira East) (view looking west)



Modified after Pratt (2006)

- Porphyry Intrusions
- Mara Fm.
- Soraya Fm.
- Chuquibambilla Fm.

Bedding Trace

Younging Direction

Thrust Faults

Fold Axes

Present Erosion Surface



# Soraya Fm.







**Late-Post Mineralization**

Monzogranite - Granodiorite

**Late Mineralization**

Monzodiorite - Quartz Monzodiorite

Quartz Monzonite - Granodiorite

**Syn Mineralization**

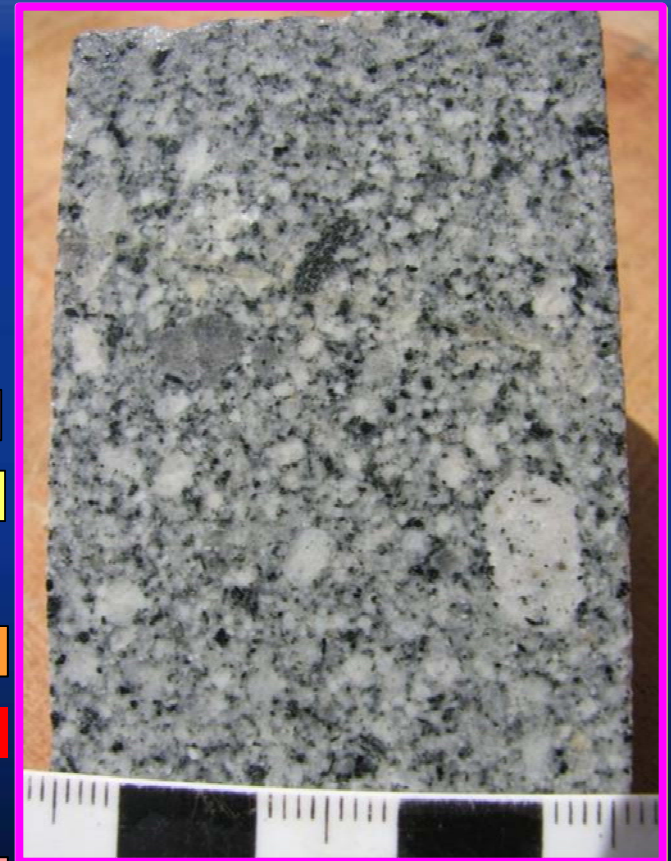
Quartz Monzonite

Monzonite - Monzodiorite

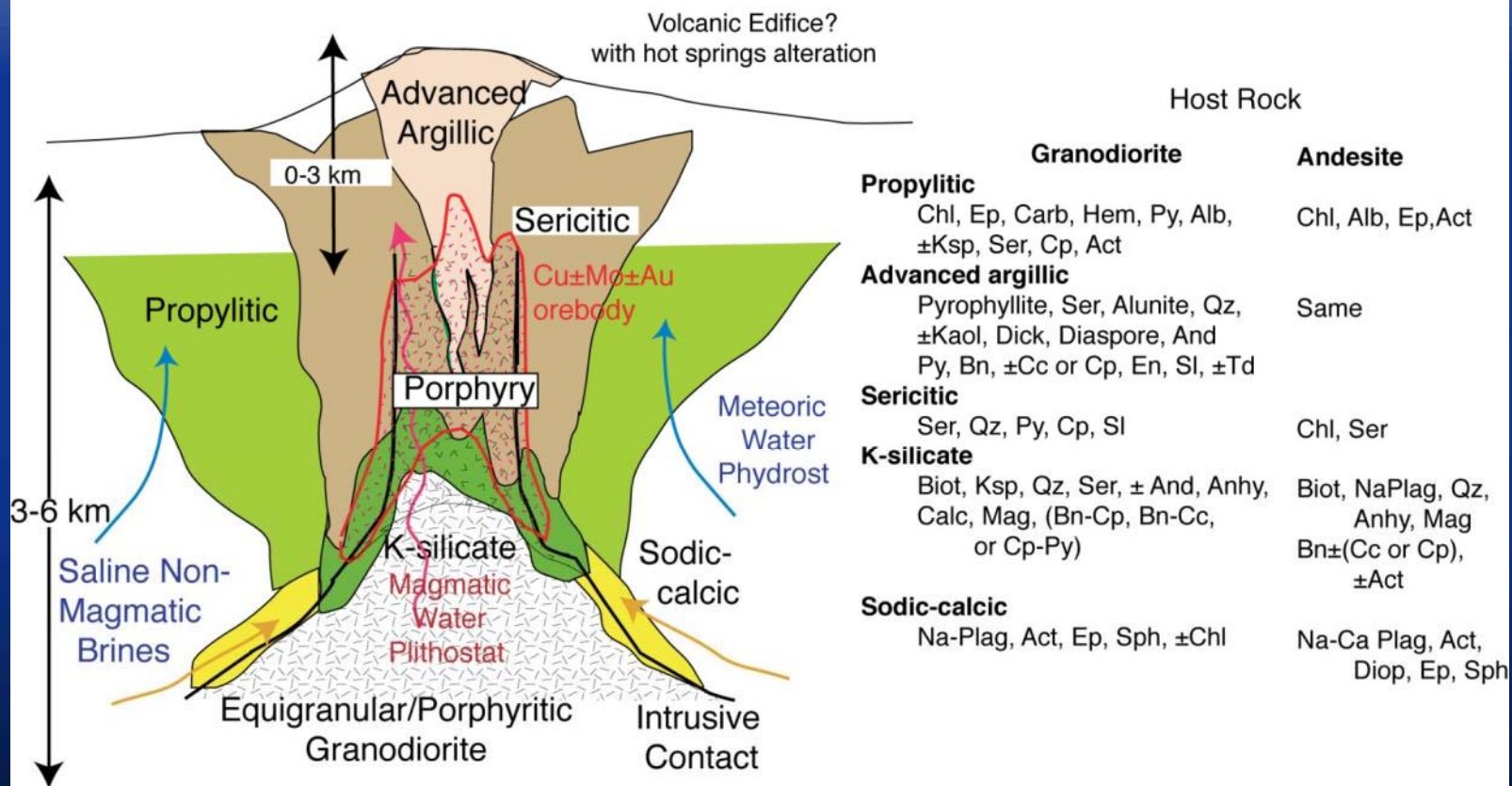
**Early-Syn Mineralization**

Quartz Diorite

Diorite



## Cross-section of a Porphyry Copper Deposit

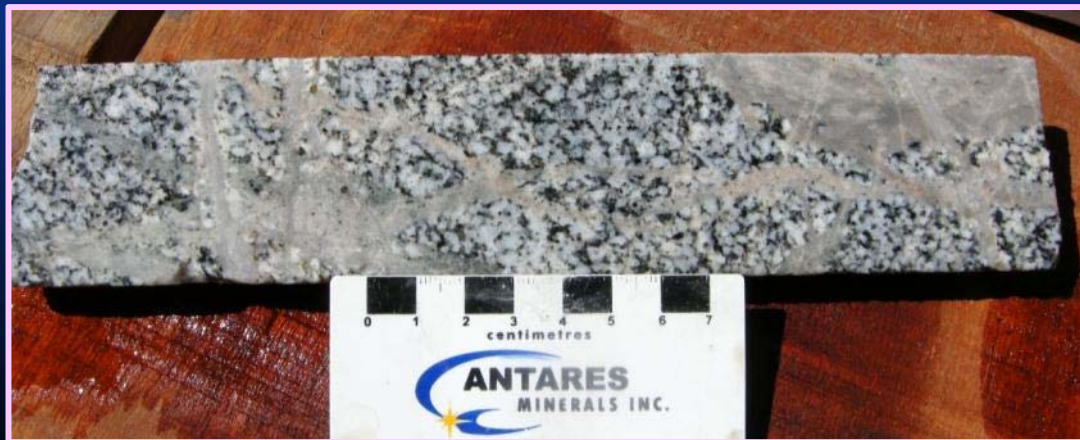


Schematic: After Gustafson & Hunt (1975); Carten (1986); Dilles et al. (2000)

Schematic diagram illustrating typical alteration zoning in porphyry copper deposits developed in granitoid crustal rocks (After Gustafson & Hunt, 1975). Sodic-calcic zones after Carten (1986). In sodium, magnesian, and iron-rich island arc sequences, mafic silicates (chlorite, biotite) and albite dominate.

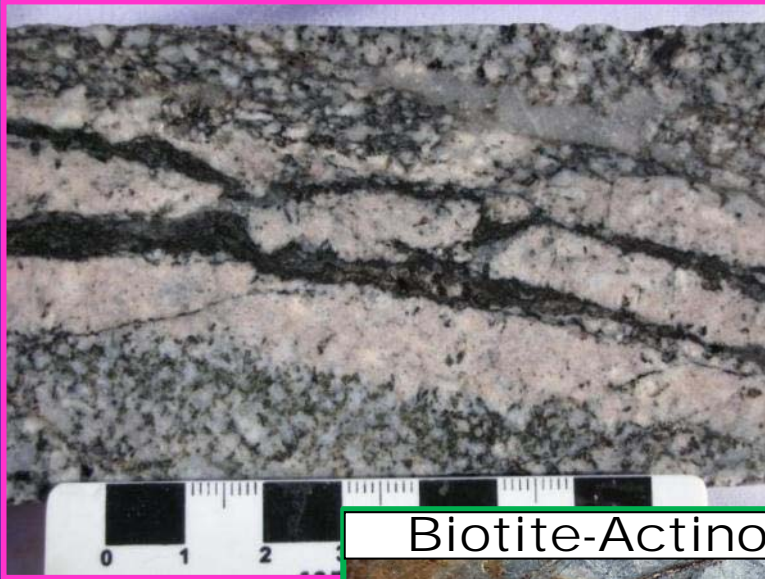


# Potassic Alteration K-feldspar





# Potassic Alteration Biotite-(Actinolite)

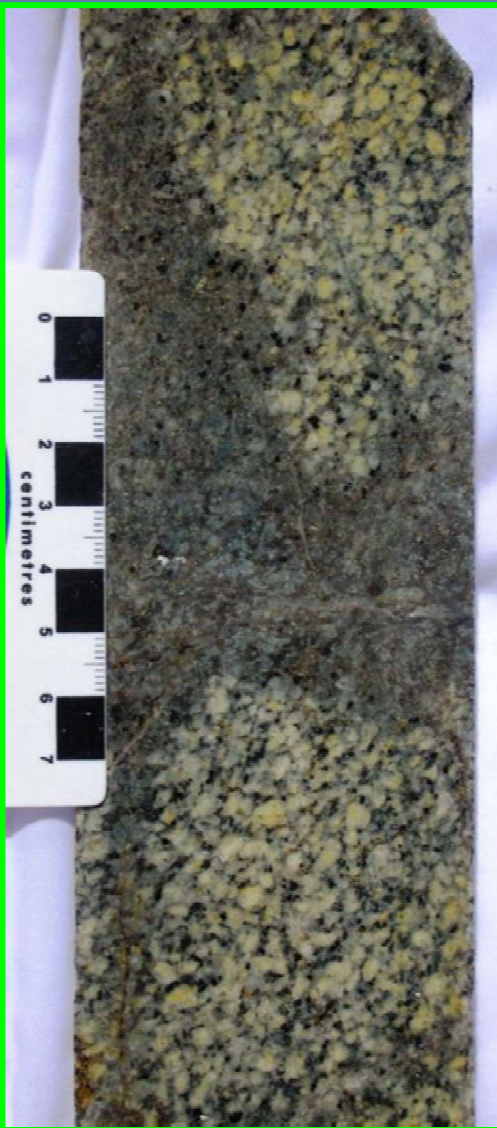


Biotite-Actinolite Veinlets

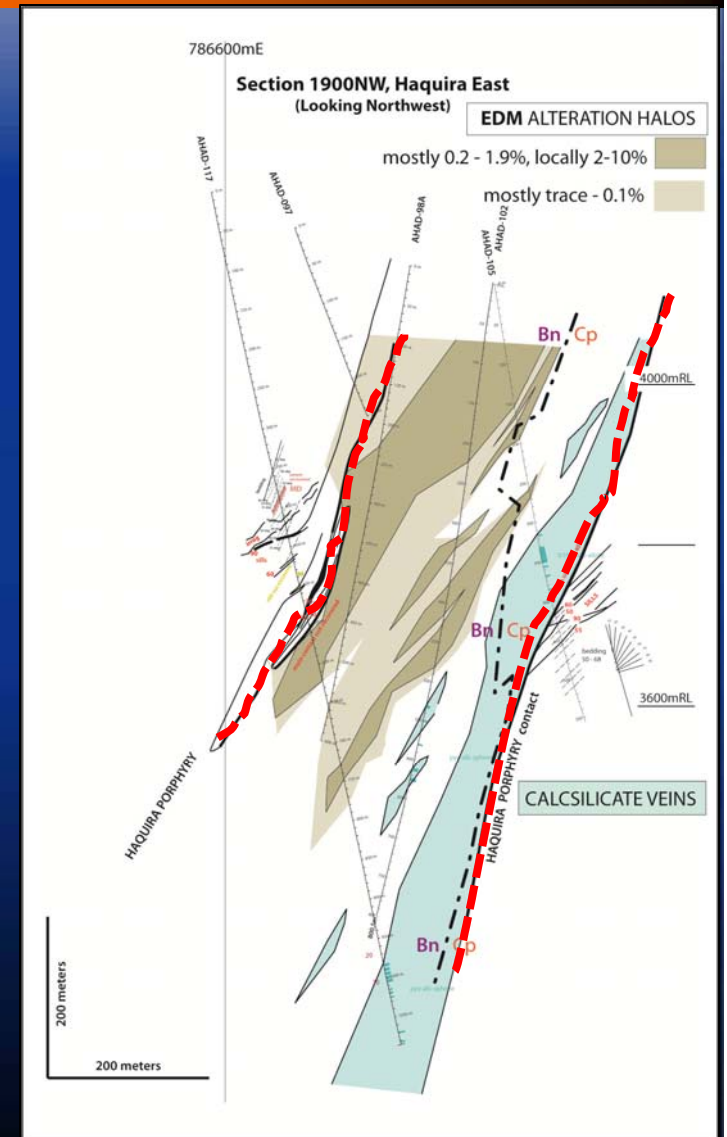


"Shredy Biotite"





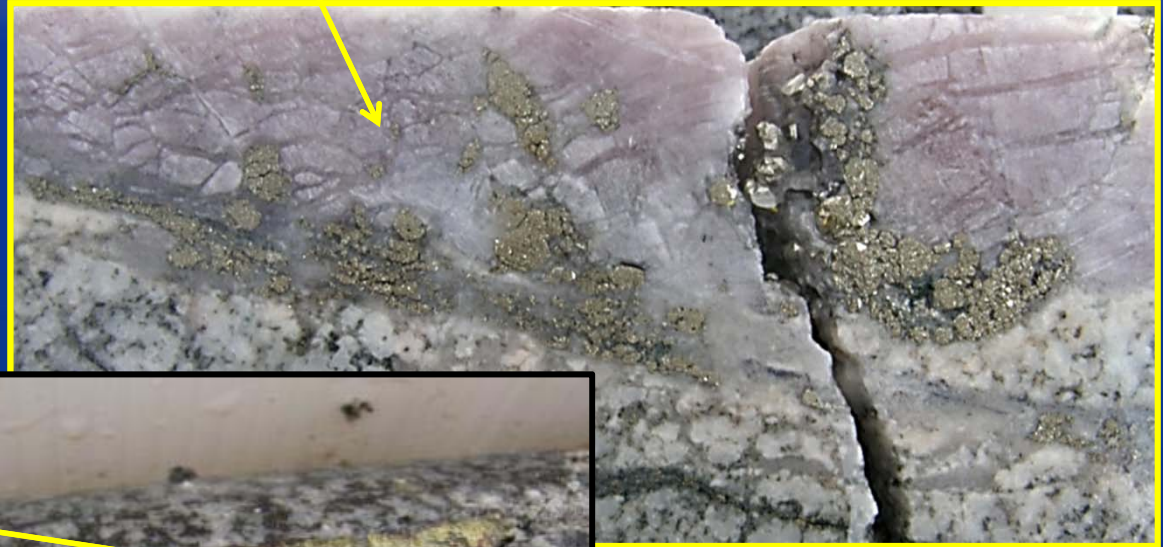
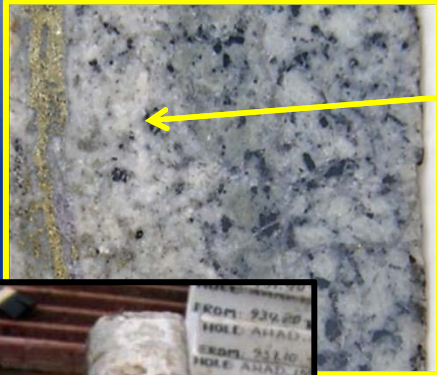
- ✦ **Mineralogy of EDM halos consists of various mixtures of biotite, muscovite, K-feldspar, andalusite, and rarely corundum, indicative of temperatures close to 600°C.**
- ✦ **EDM's in other deposits**
  - ✦ Butte, Montana
  - ✦ El Salvador, Chile
  - ✦ Chuquicamata, Chile
  - ✦ Pelambres, Chile
- ✦ **Very high density of EDM veins at Haquira in relation to most deposits**



# Deep Anhydrite

AHAD-120 >1000 m  
 AHAD-194 >550 m

CaSO<sub>4</sub> precipitates at 375-500°C,  
 dissolves <375°C



Vuggy Textured Veins  
 Leached Anhydrite ?

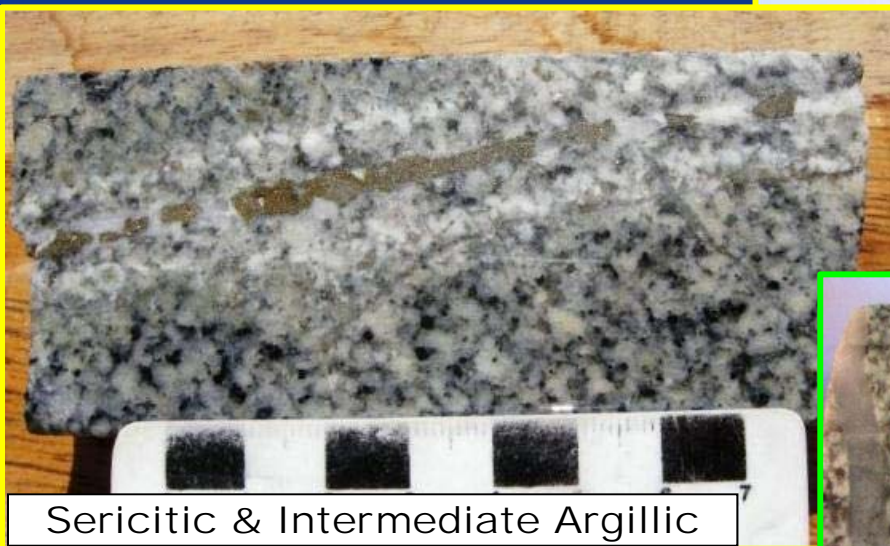


# Sericitic & Intermediate Argillic Alteration

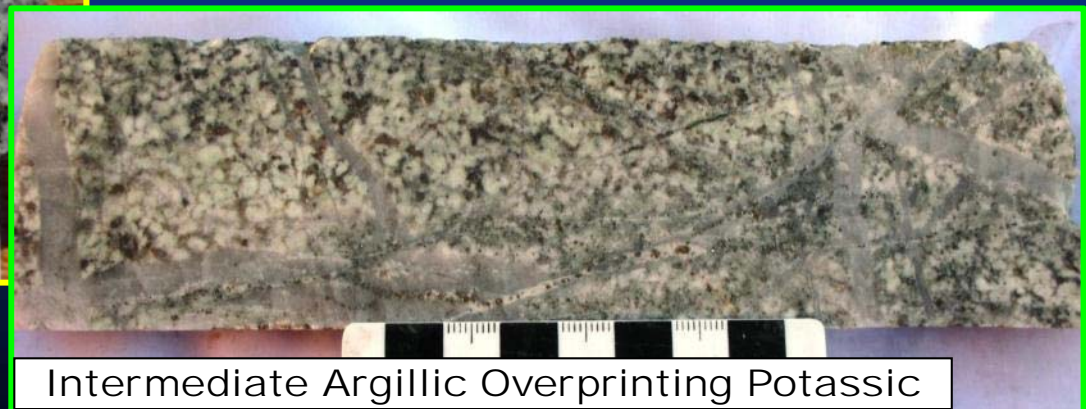
Sericitic Overprinting Potassic



Sericitic Alteration (Phyllic, QSP)



Sericitic & Intermediate Argillic



Intermediate Argillic Overprinting Potassic



# Sericitic & Intermediate Argillic Alteration

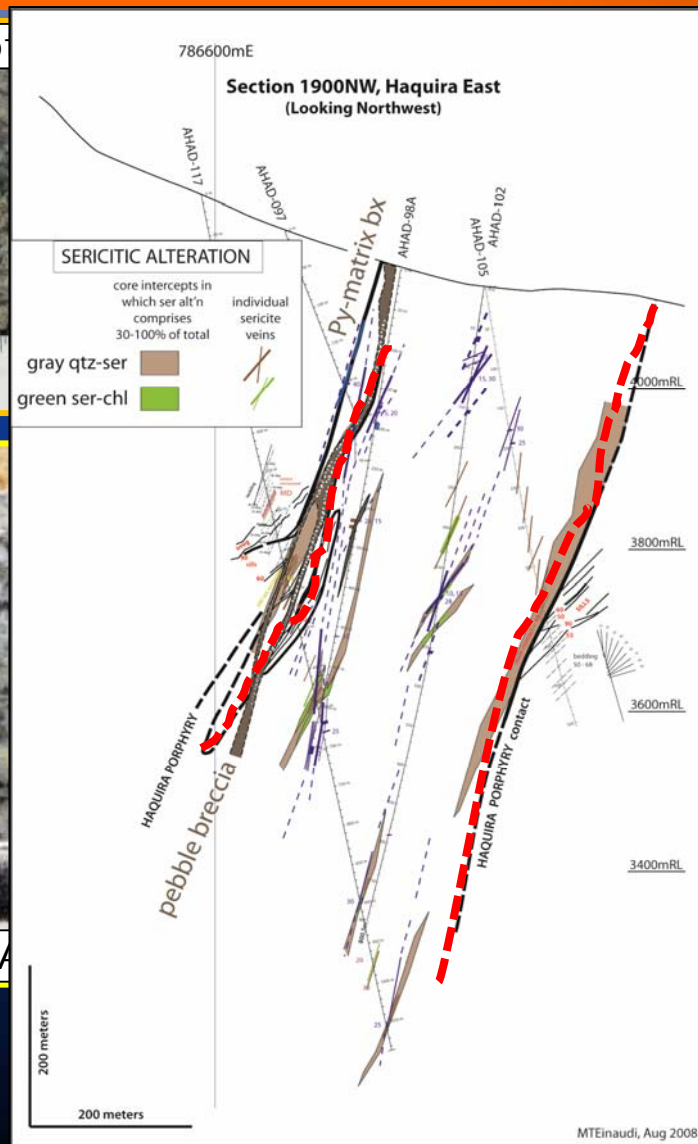
Sericitic Overprinting Potassic



Argillic, QSP)



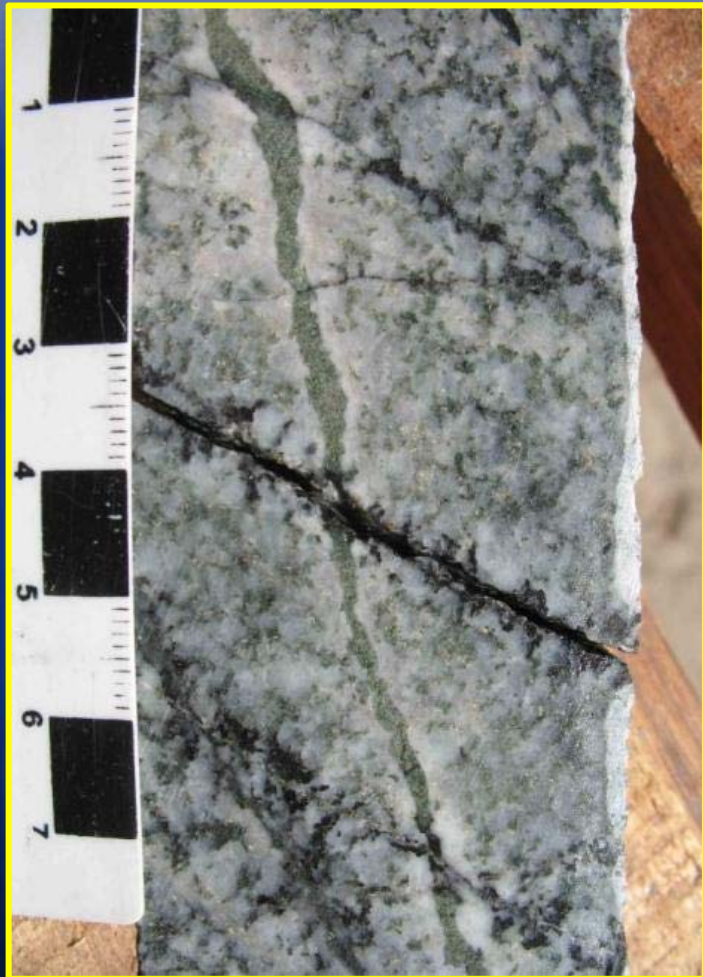
Sericitic & Intermediate A



Sericitic Overprinting Potassic

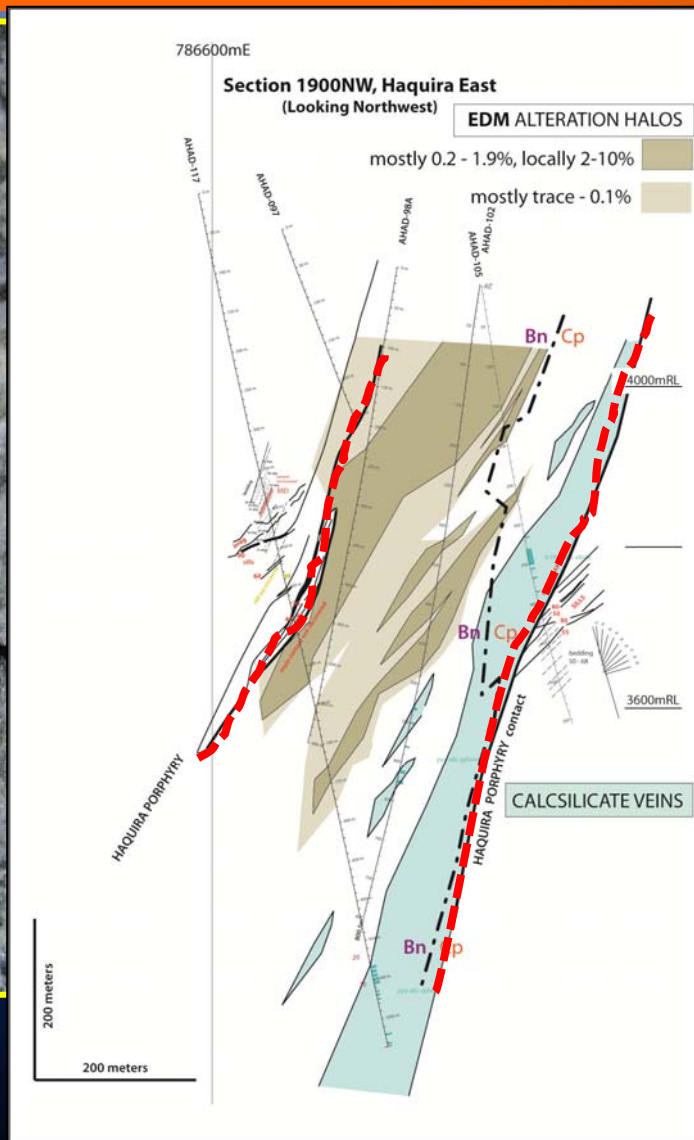
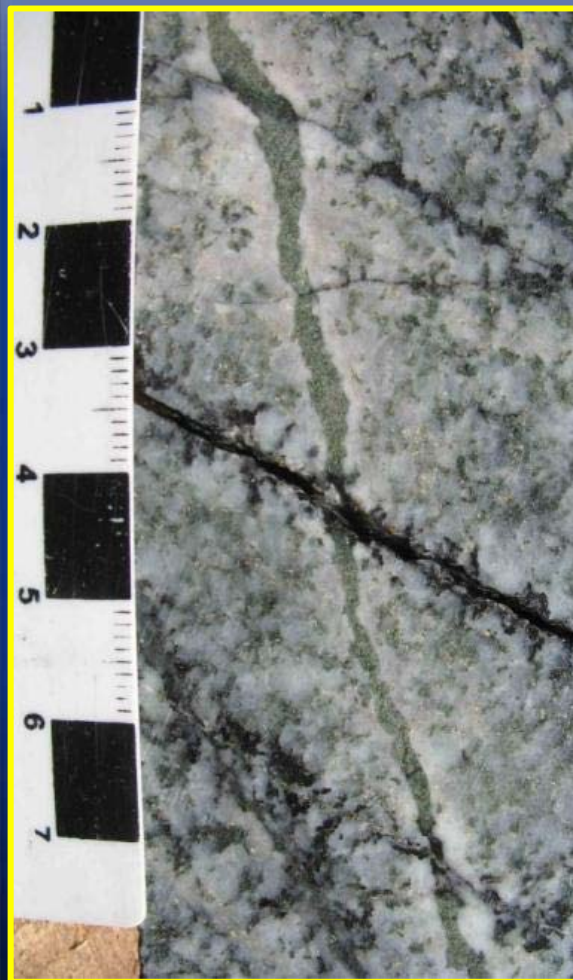


# Sodic - calcic veins





# Sodic - calcic veins



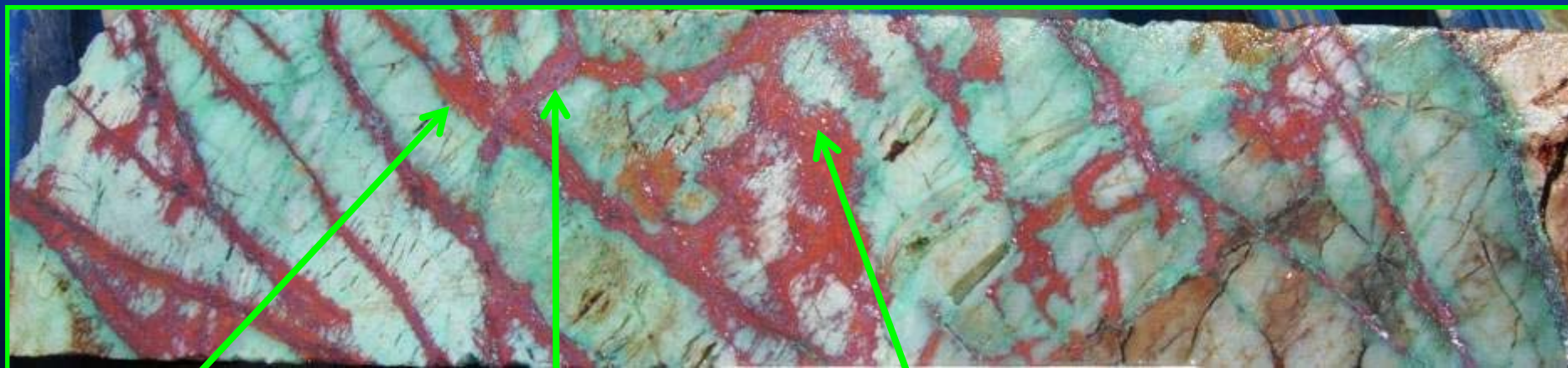
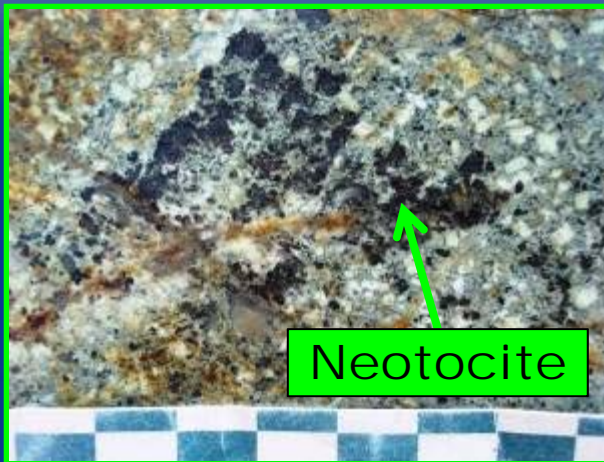


# Silicic Alteration





# Cu - Oxides







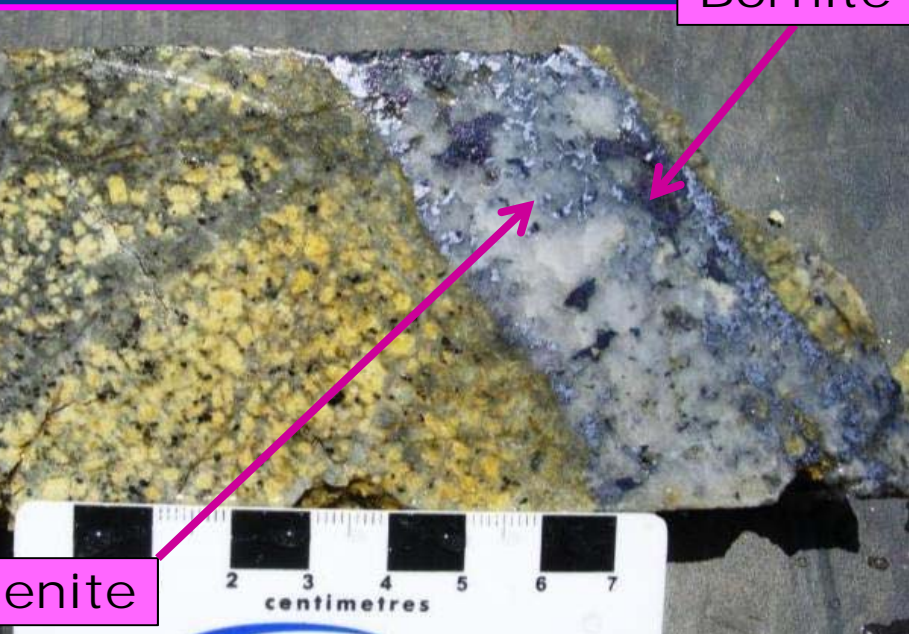
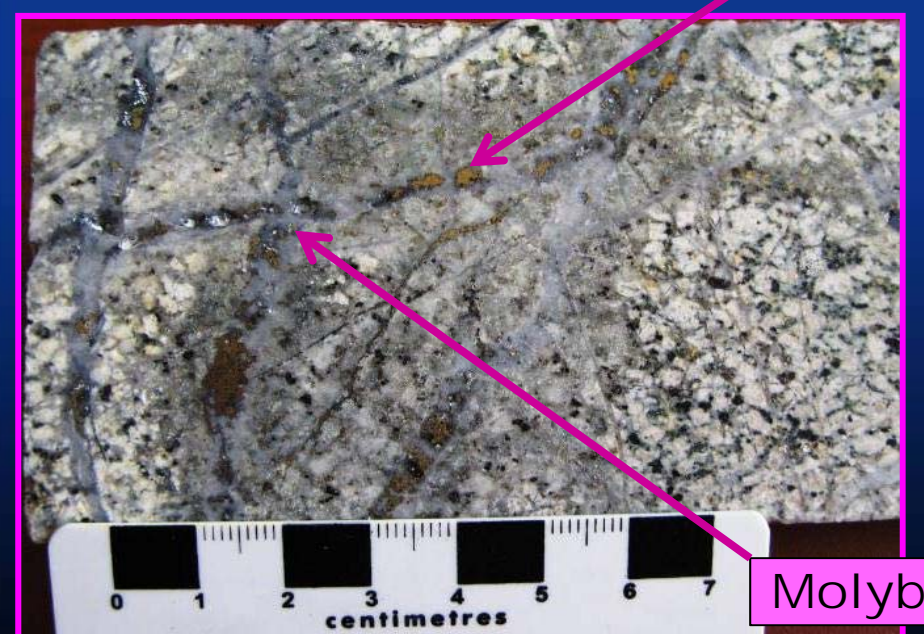
Chalcocite



Chrysocolla



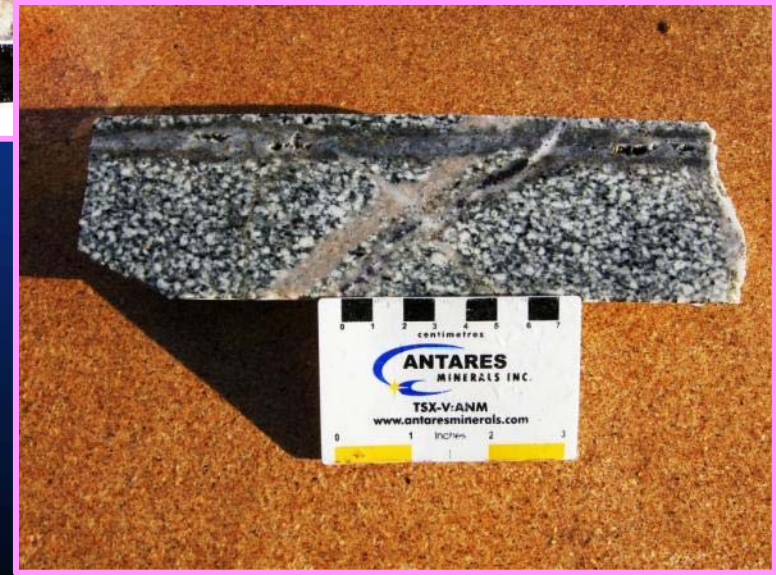
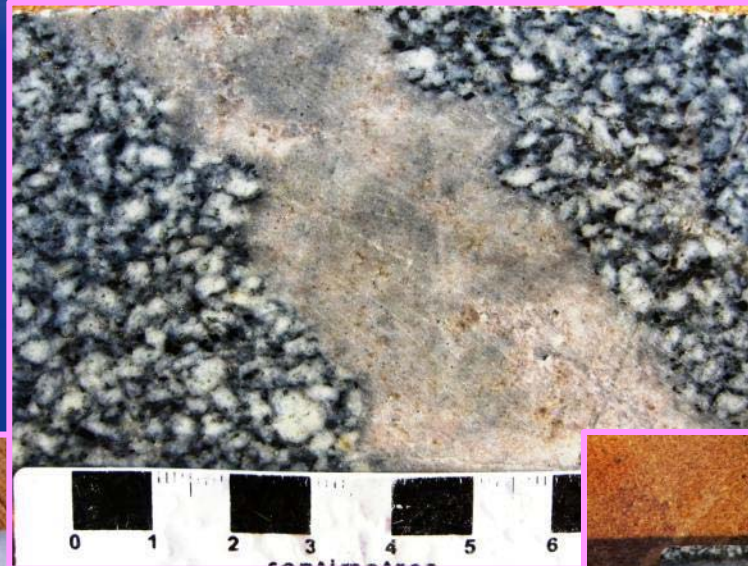
# Primary Cu-Mo-Fe Sulphides



No	Type	Alteration	Cuts	Notes
1	Aplite	none	-	Vein-dikes grade to 2
2	Qtz-(Kspar)	Bio	1	
3	Actinolite ± Cp ± Py	Plag ± Diop ± Act	1,2	Sodic-Calcic
4	Biotite±(rare sulf)	Bio	3	Bio bx & crackles
5	EDM selvages (Cp±Bn)	Bio-Musc	4	
6	Qtz-Cp±Bn±Mb (B vein)	Bio	4,5	Distinct centerline
7	Cp±Bn (sulf vn)	Bio	6	
8	Qz-Mb (banded)	Bio	6,7	Some early (post-3)
9	Py±Cp (D vein)	Ser±Chl	8	
10	Py?	Illite Kaol, Smect,Chl	9?	Outer selvage to D



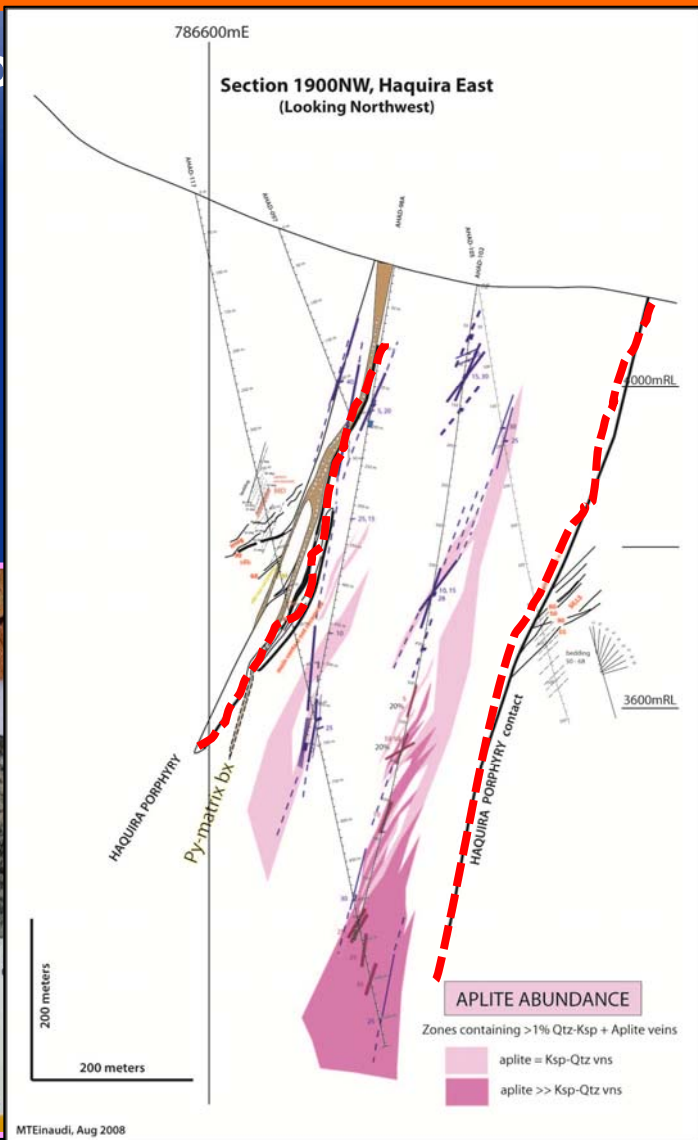
## (1) Aplite Dykes & (2) Quartz-K-feldspar veins (non-mineralizing)



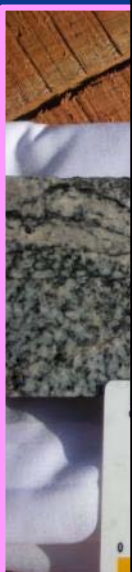
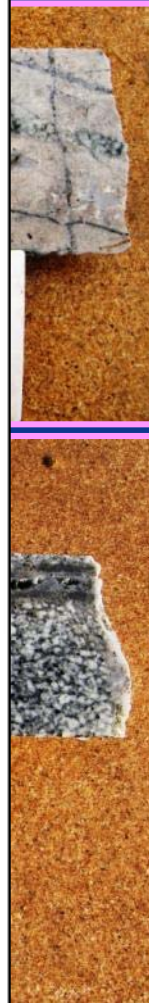
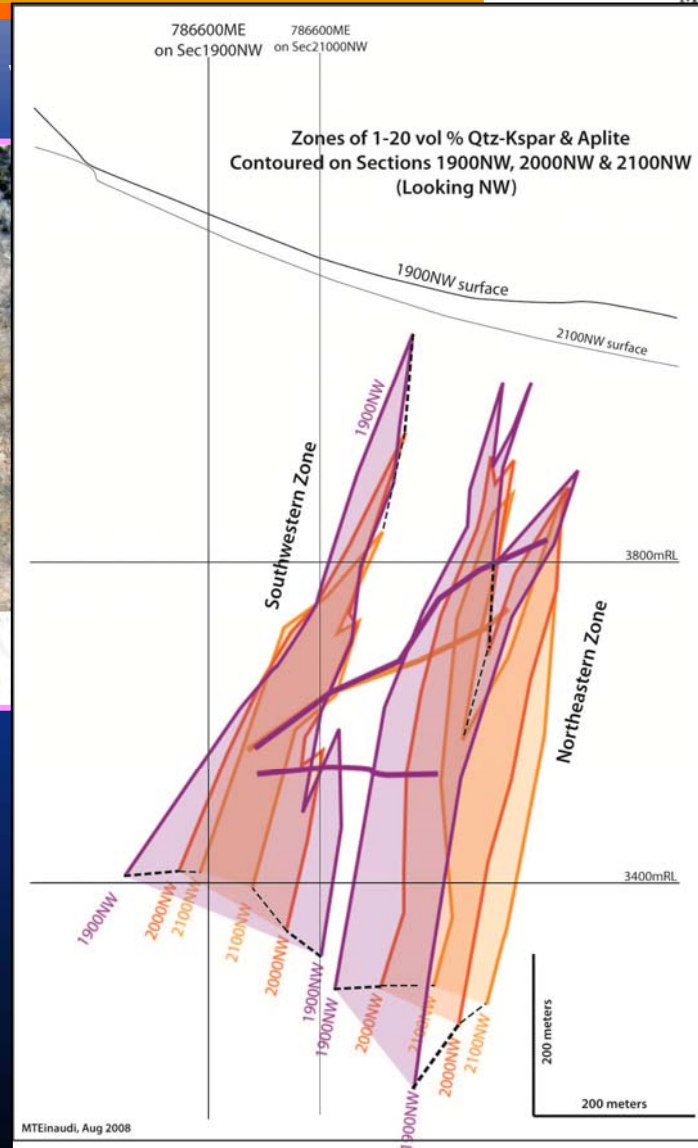


# Haquira East Vein Chronology

(1) Ap

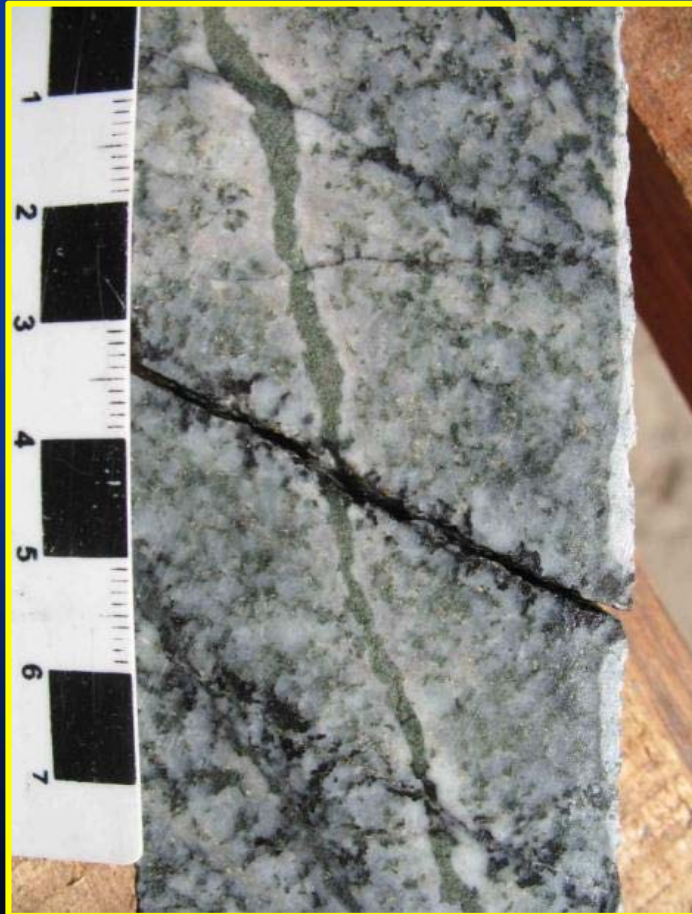


Idspar



(3) Calc-silicate (px-amp) veins and patches (**non-mineralizing**)

(4) Biotite veinlets (**rare sulphides**)

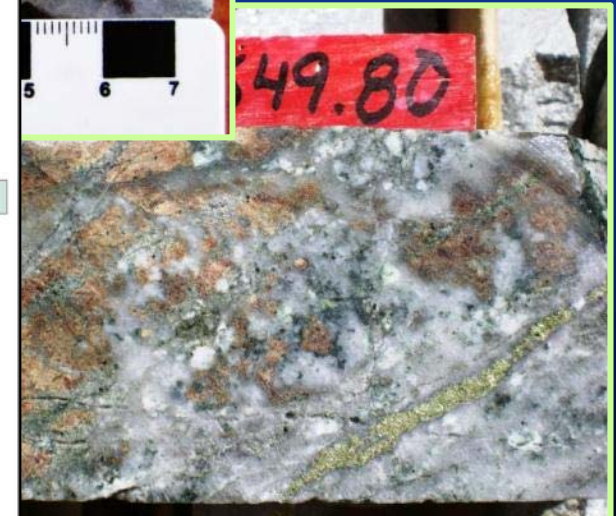
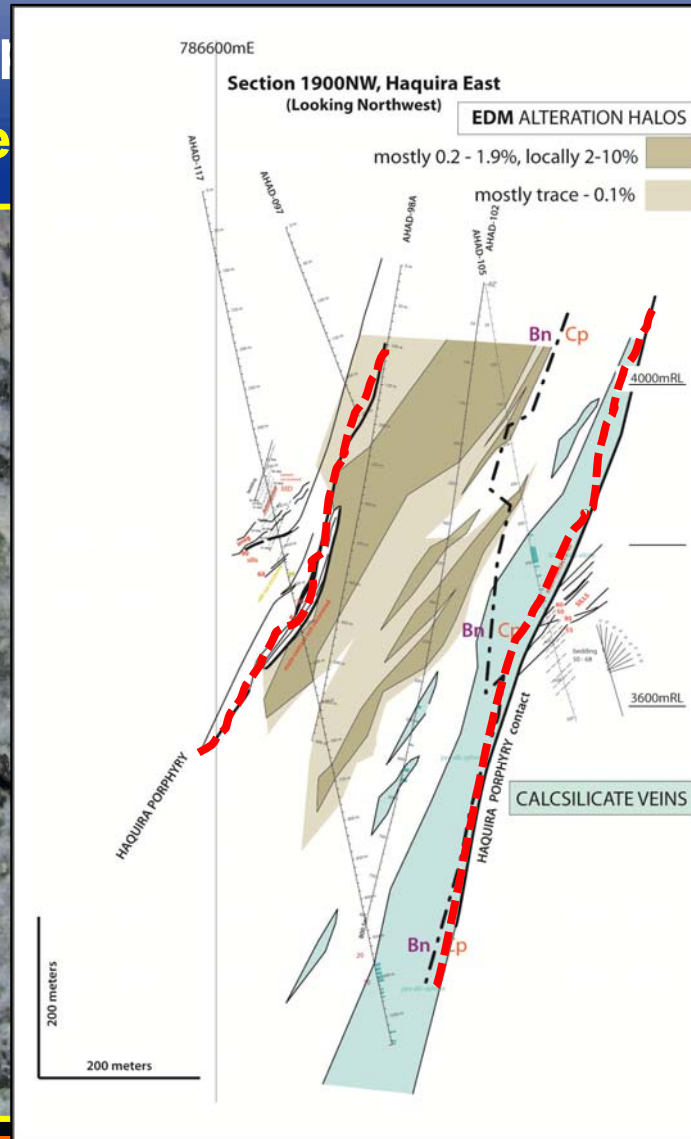
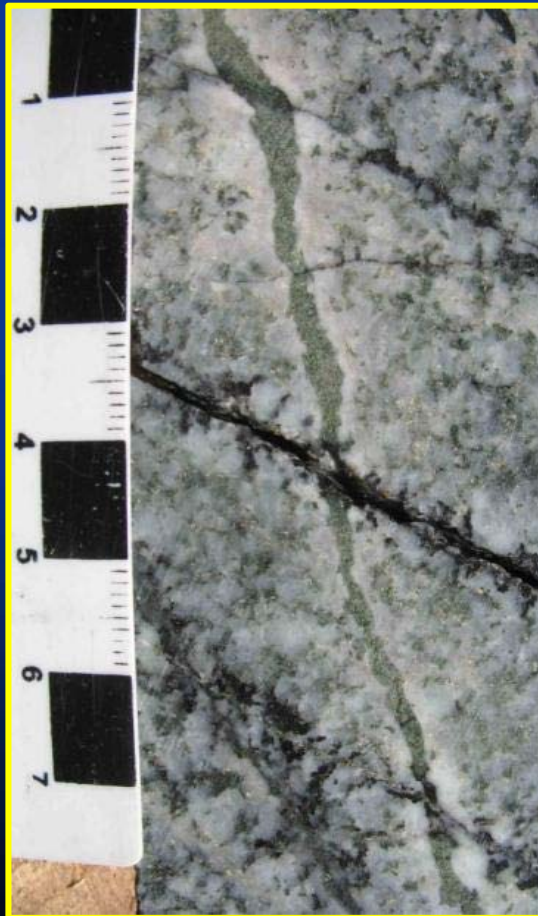




# Haquira East Vein Chronology

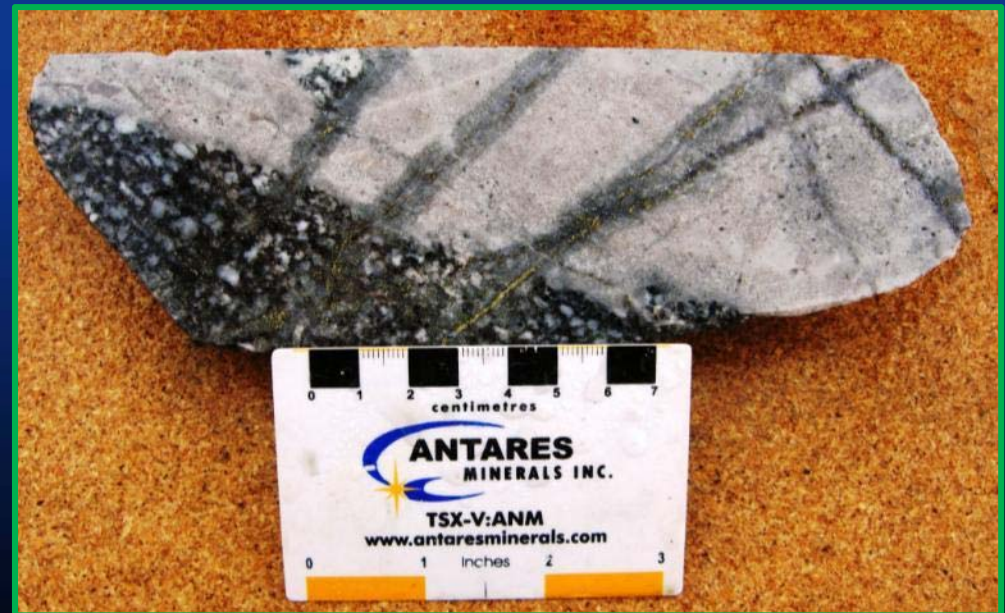
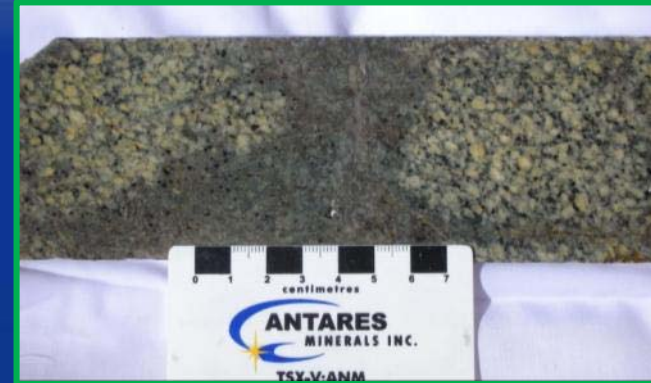
- (3) Calc-silicate (px-amp)
- (4) Biotite veinlets (rare)

mineralizing)





## (5) EDM (early dark micaceous) veins (~600°C) (mineralizing)

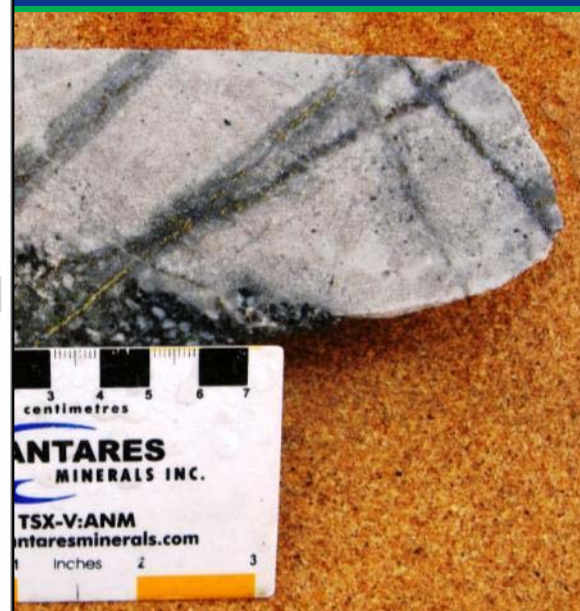




# Haquira East Vein Chronology

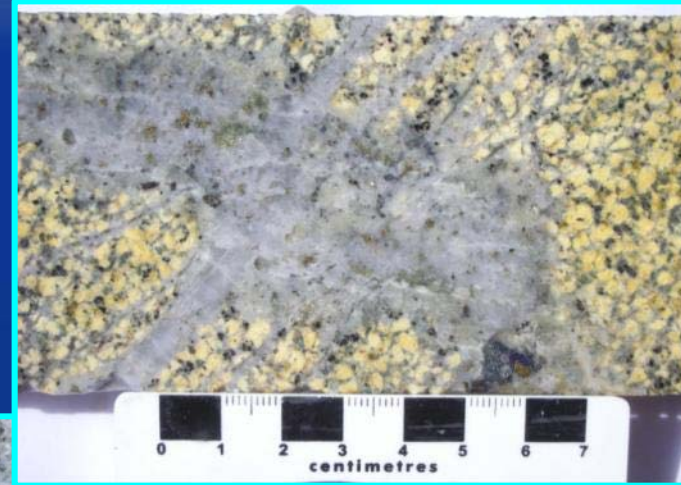
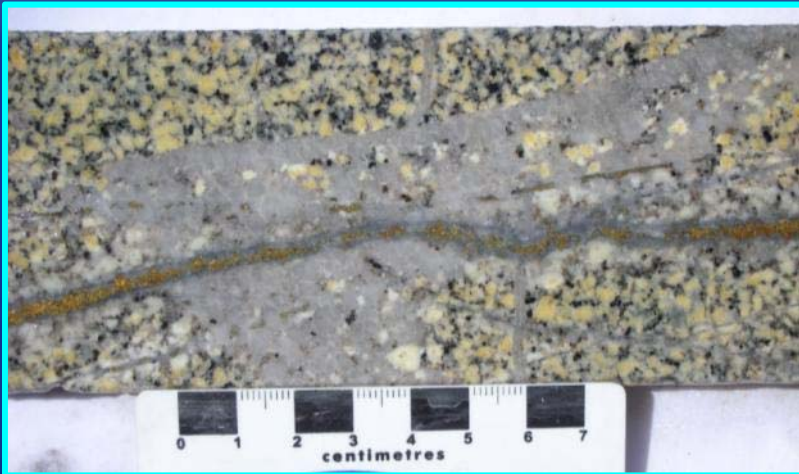
(5) EDM (early dark mic

eralizing)





## (6) (a) A-veins (hotter) & (b) B-veins (cooler) (mineralizing)

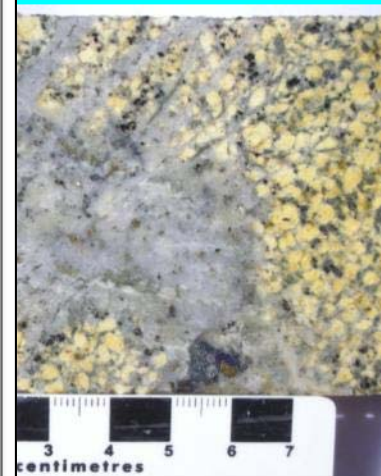
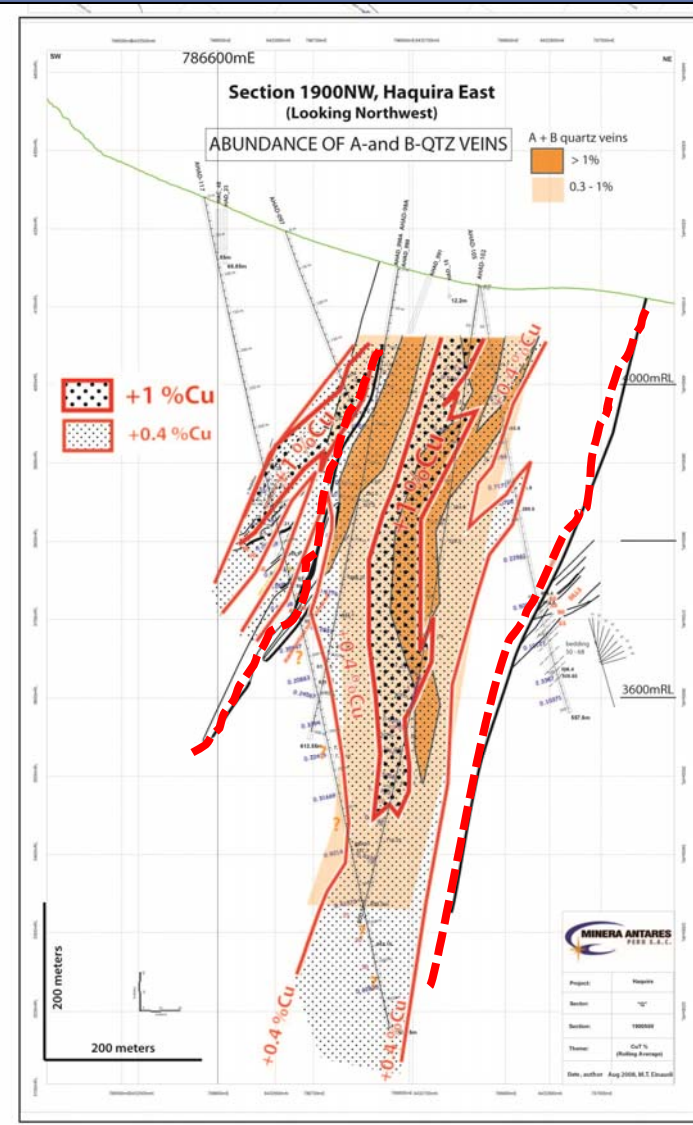
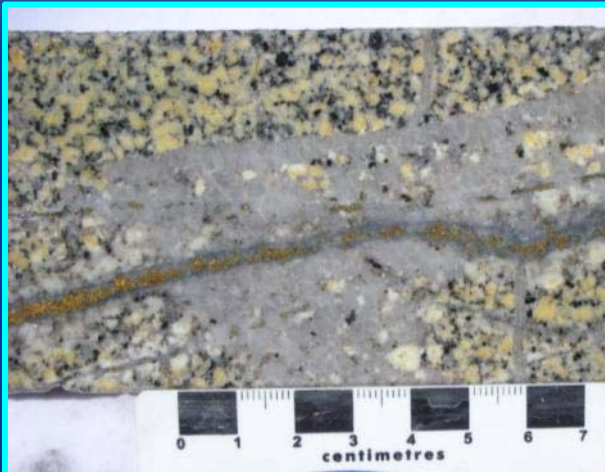




# Haqira East Vein Chronology

(6) (a) A-veins (hotter) &

izing)



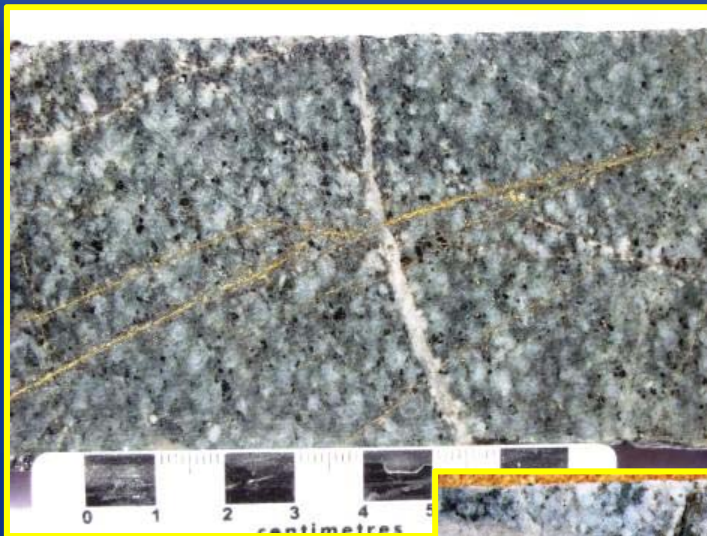


## (7) Sulphide-only veins (no quartz, no alteration haloes) (mineralizing)



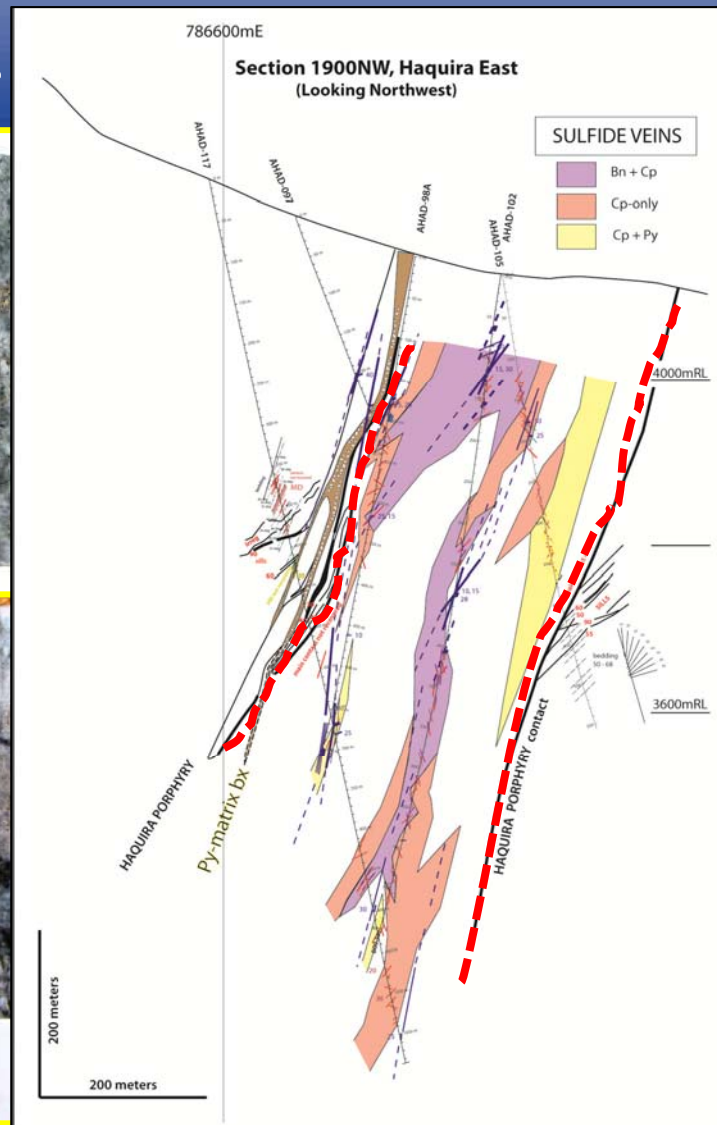
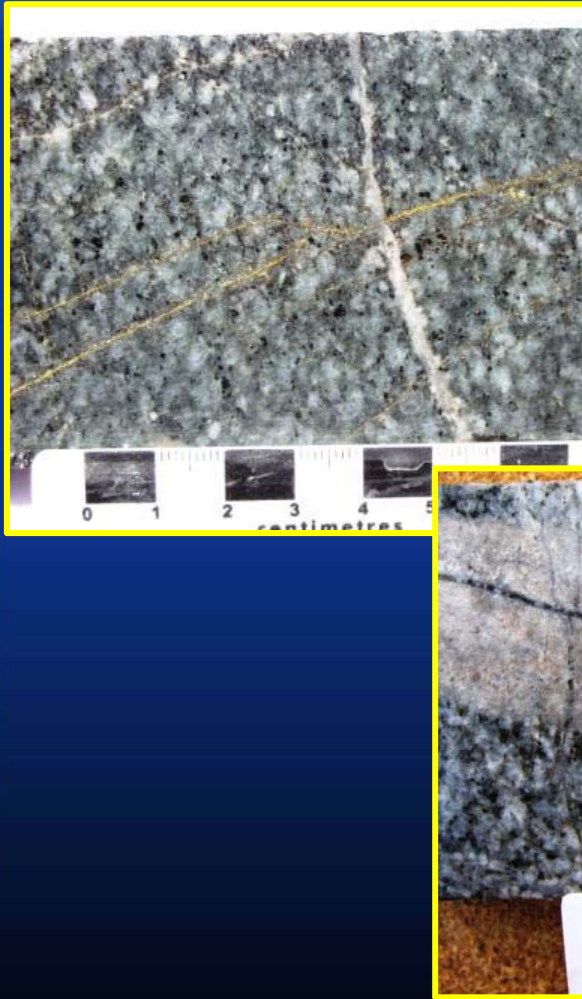


## (7) Sulphide-only veins (no quartz, no alteration haloes) (mineralizing)





## (7) Sulphide-only veins

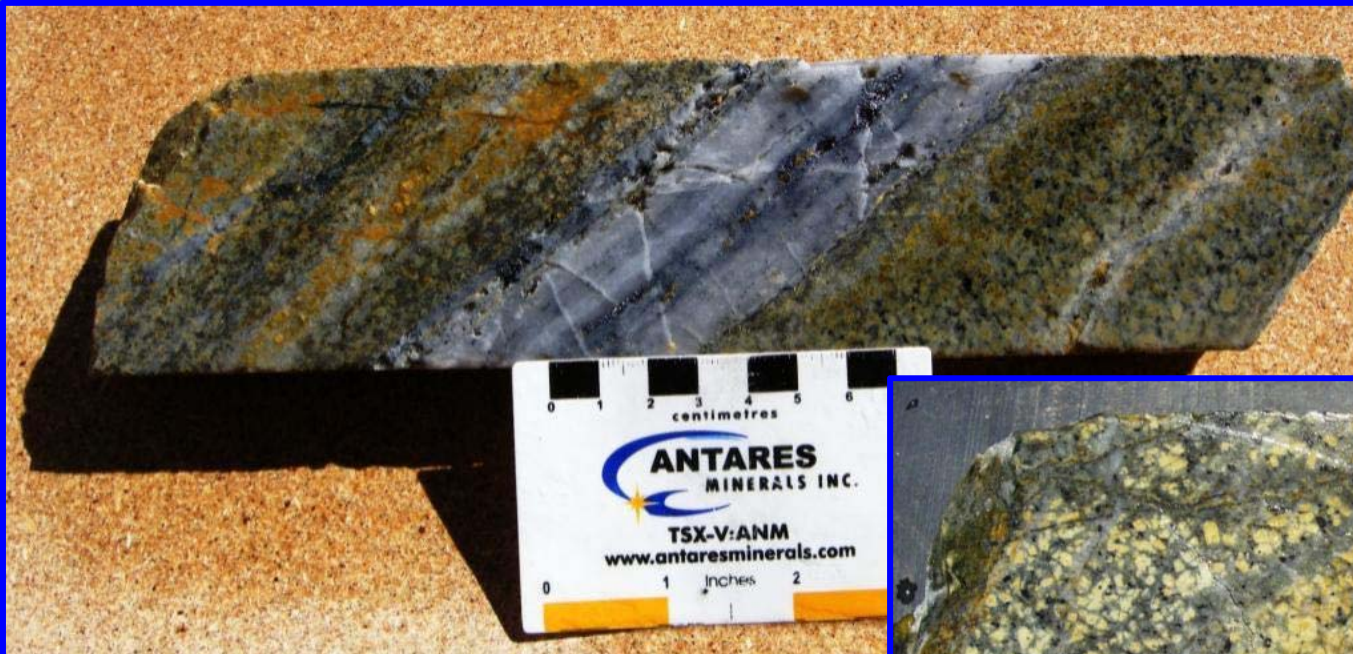


## Veins (mineralizing)





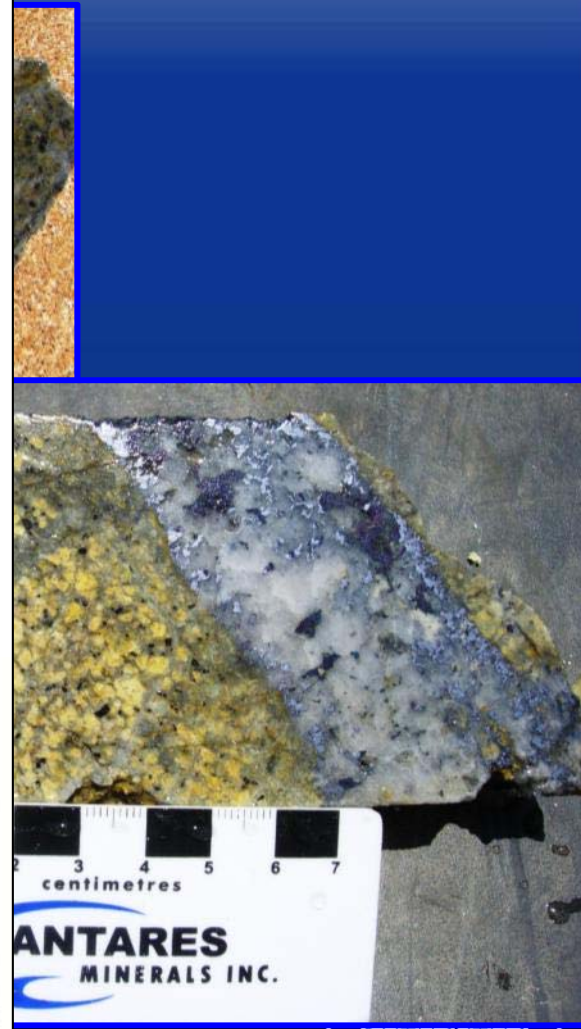
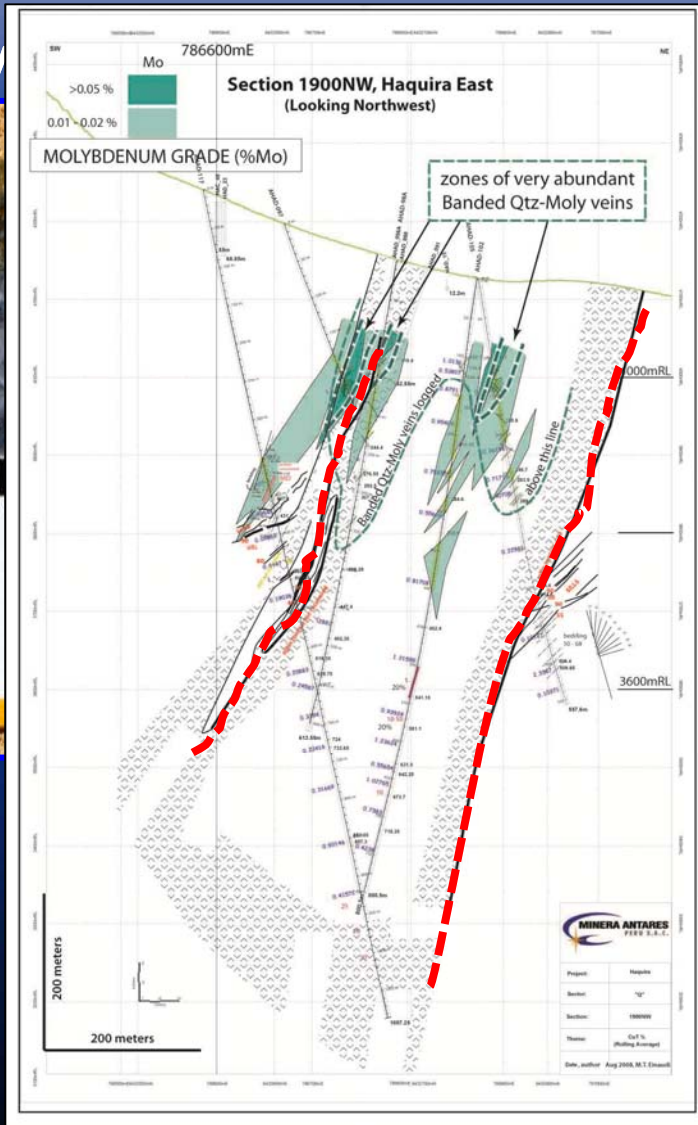
## (8) Banded Quartz-Mo veins (mineralizing)





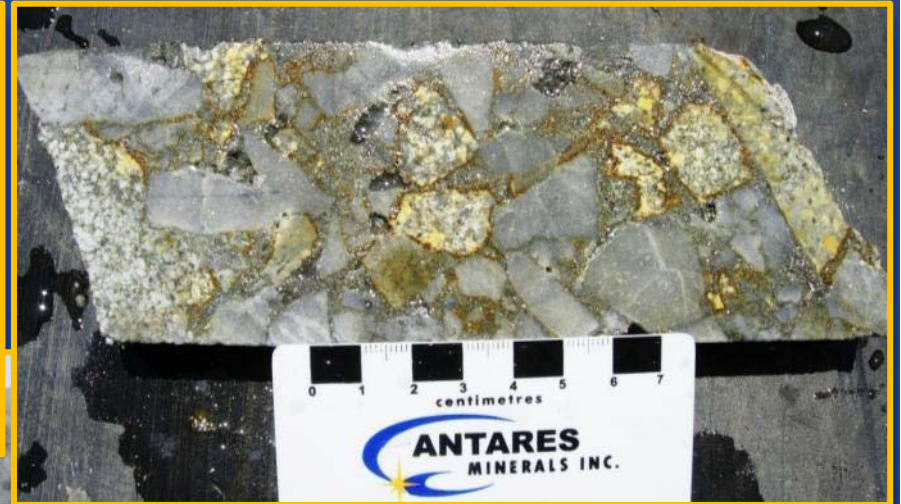
# Haquira East Vein Chronology

## (8) Banded Quartz-Mo v





## (9) D-veins (quartz-pyrite ± chalcopyrite) (late mineral)

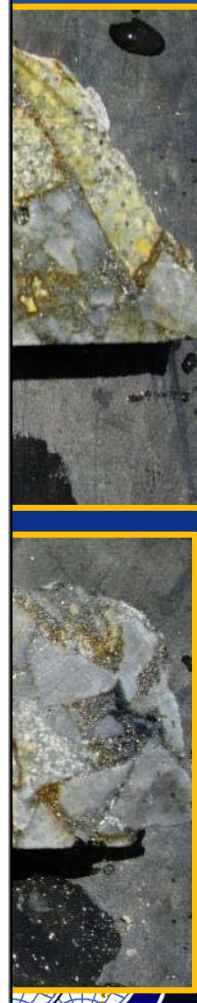
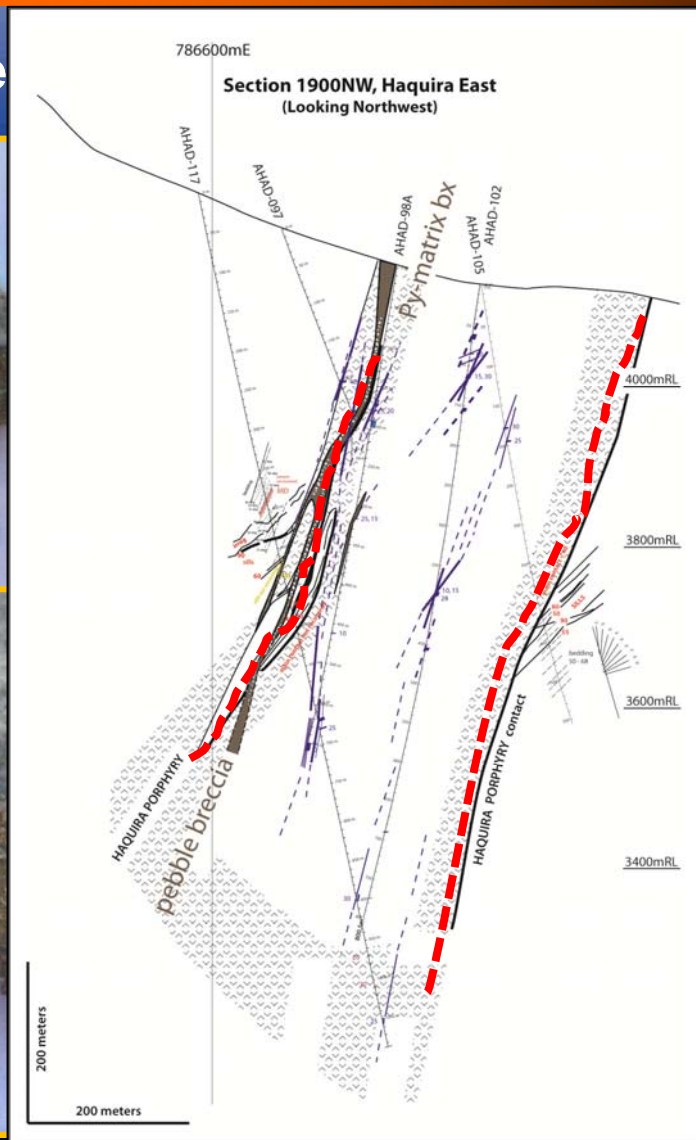
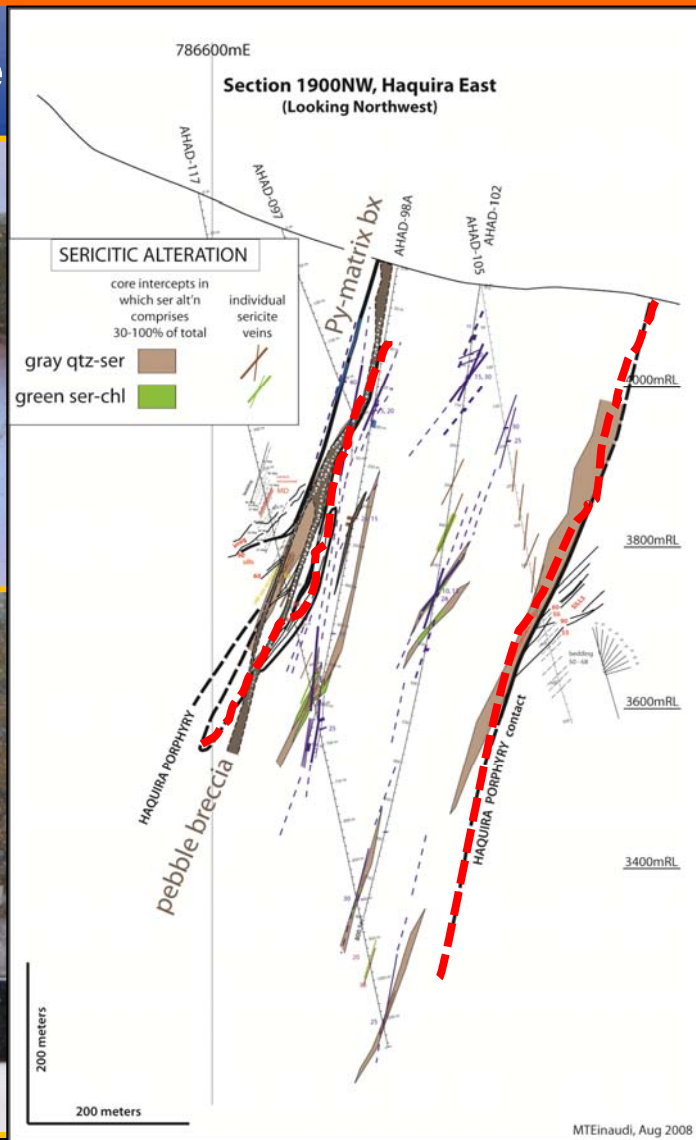




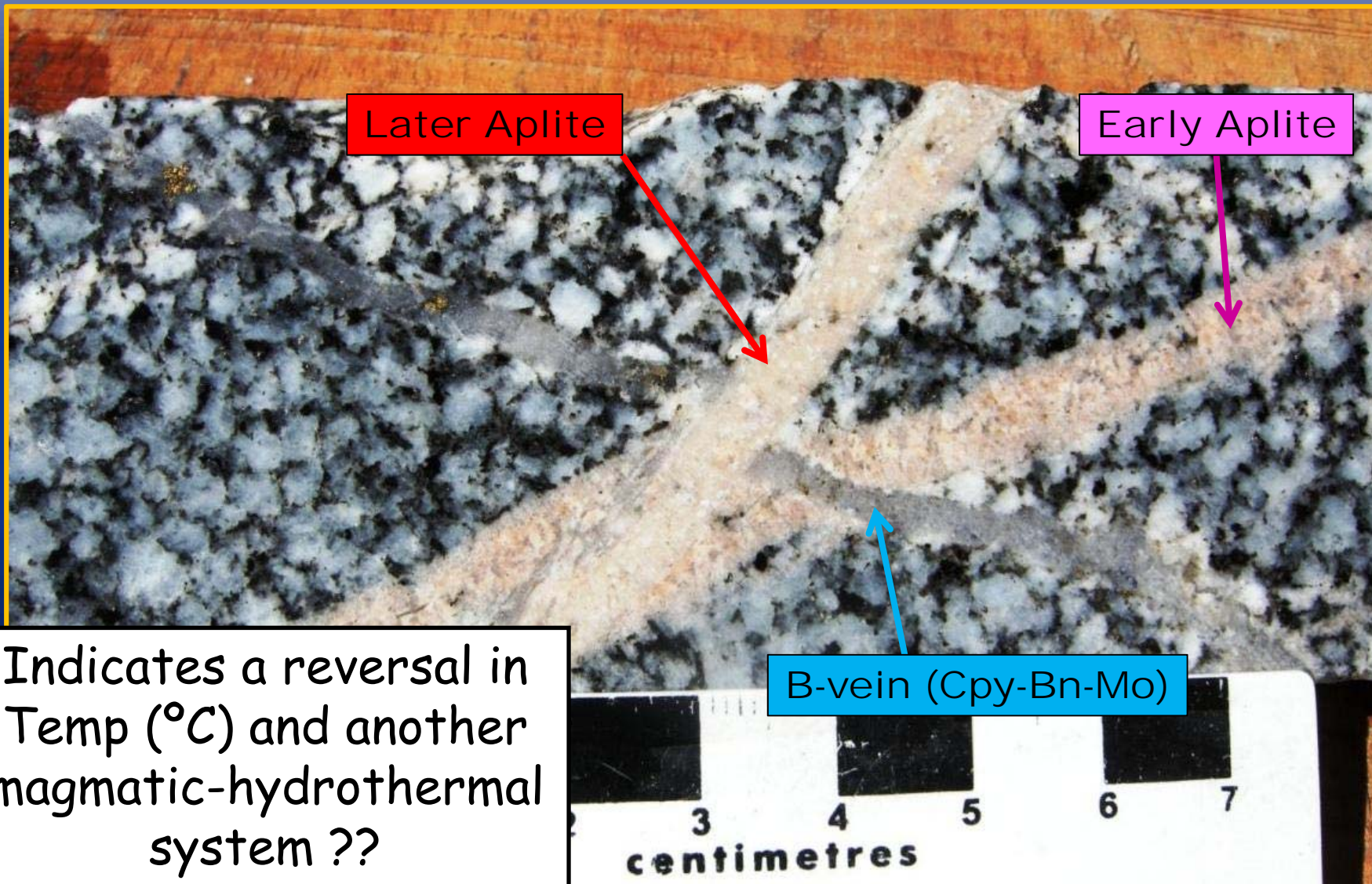
# Haqira East Vein Chronology

(9) D-ve

Pyrite

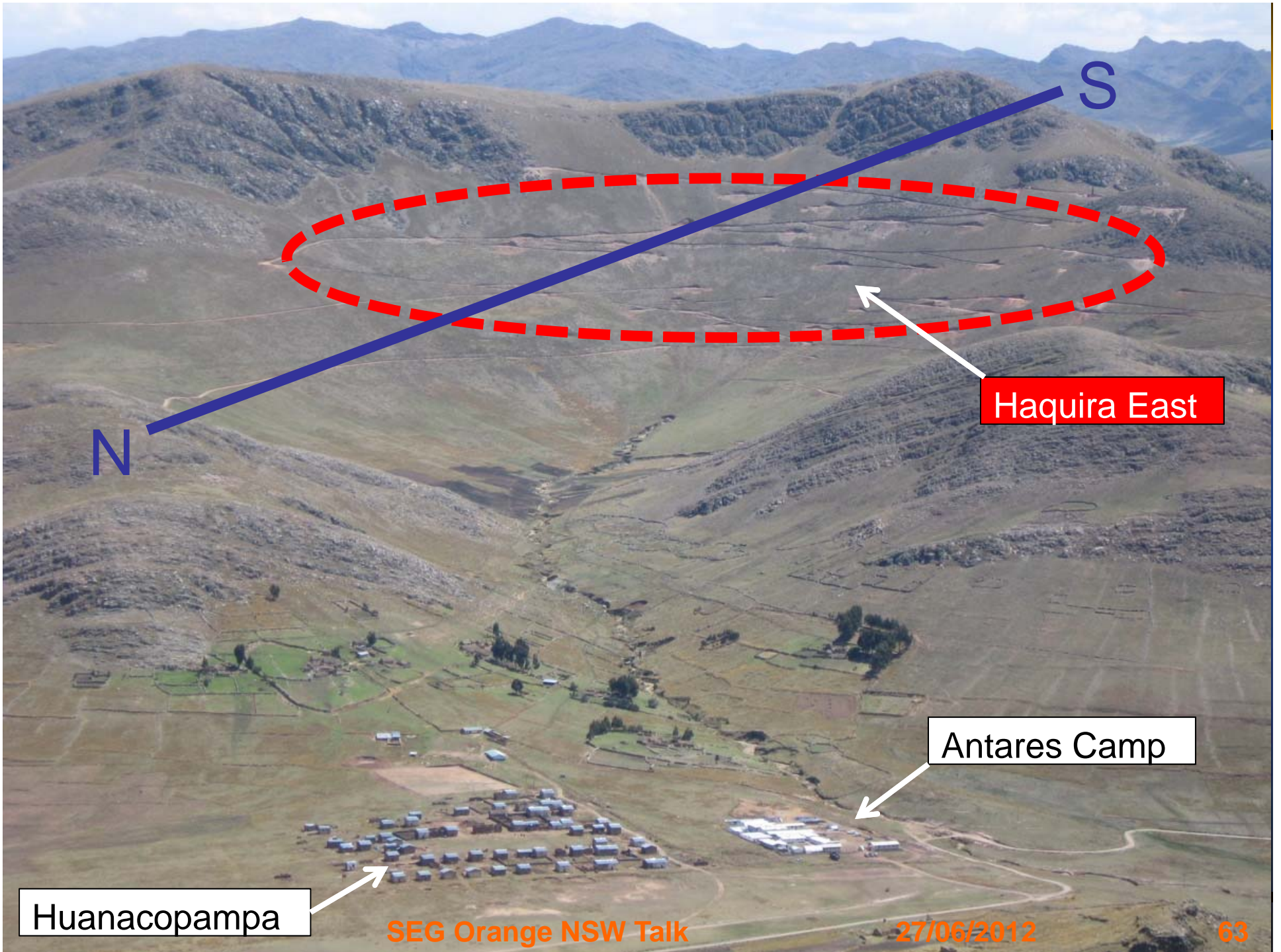






Indicates a reversal in  
Temp ( $^{\circ}\text{C}$ ) and another  
magmatic-hydrothermal  
system ??





N

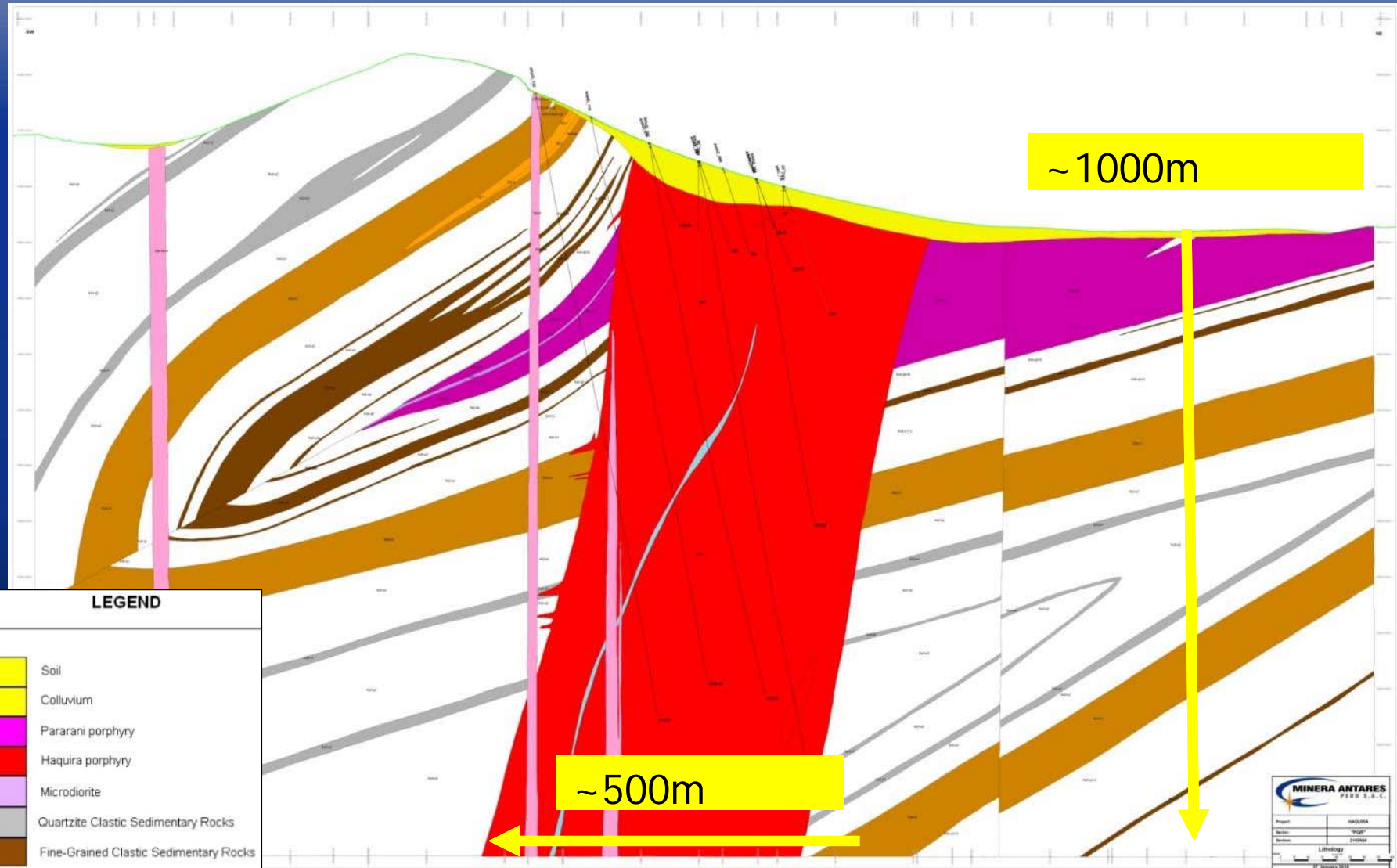
S

Haquira East

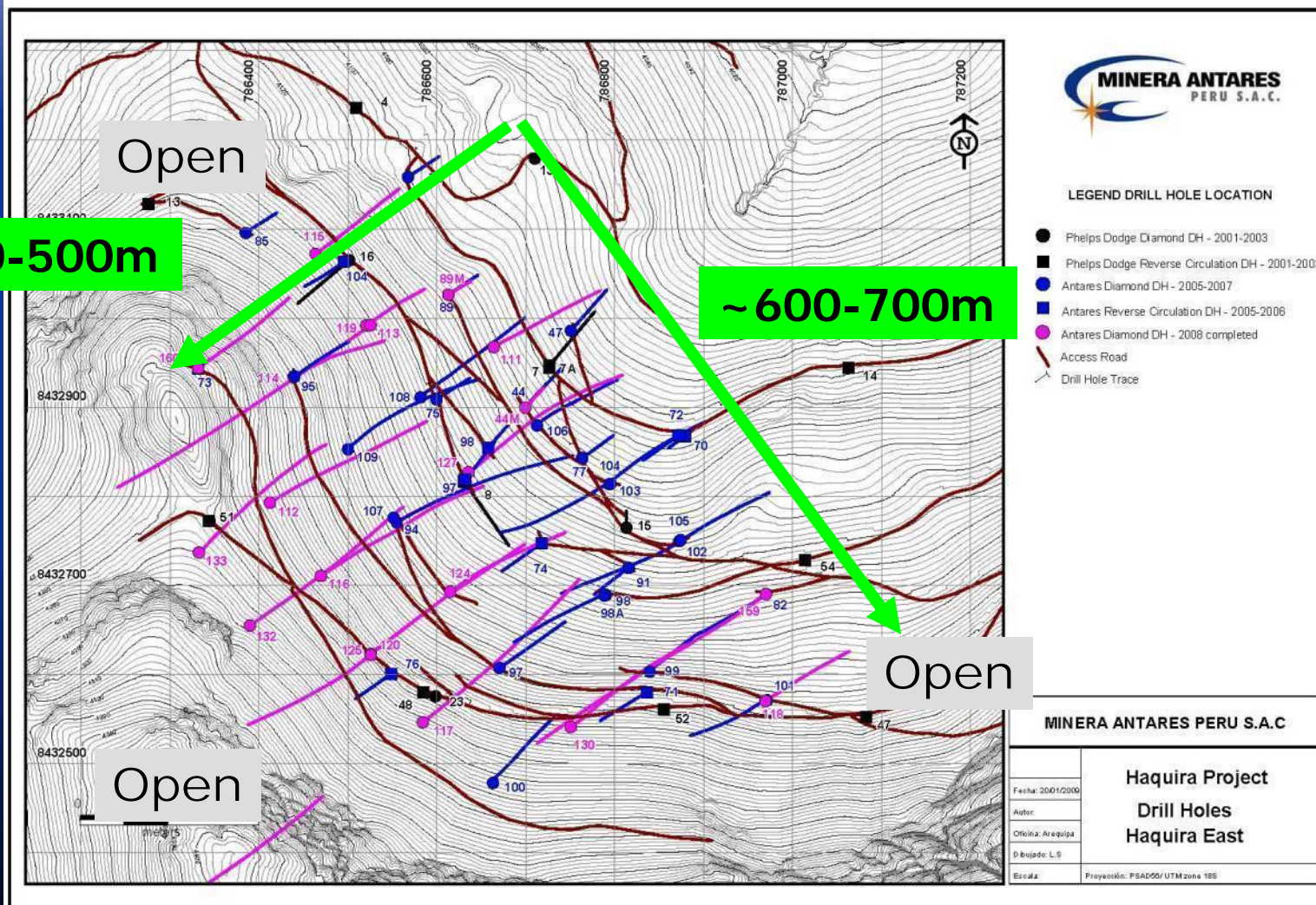
Antares Camp

Huanacopampa





# Haquira East – Level Plans



**~ 400-500m**

**~ 600-700m**

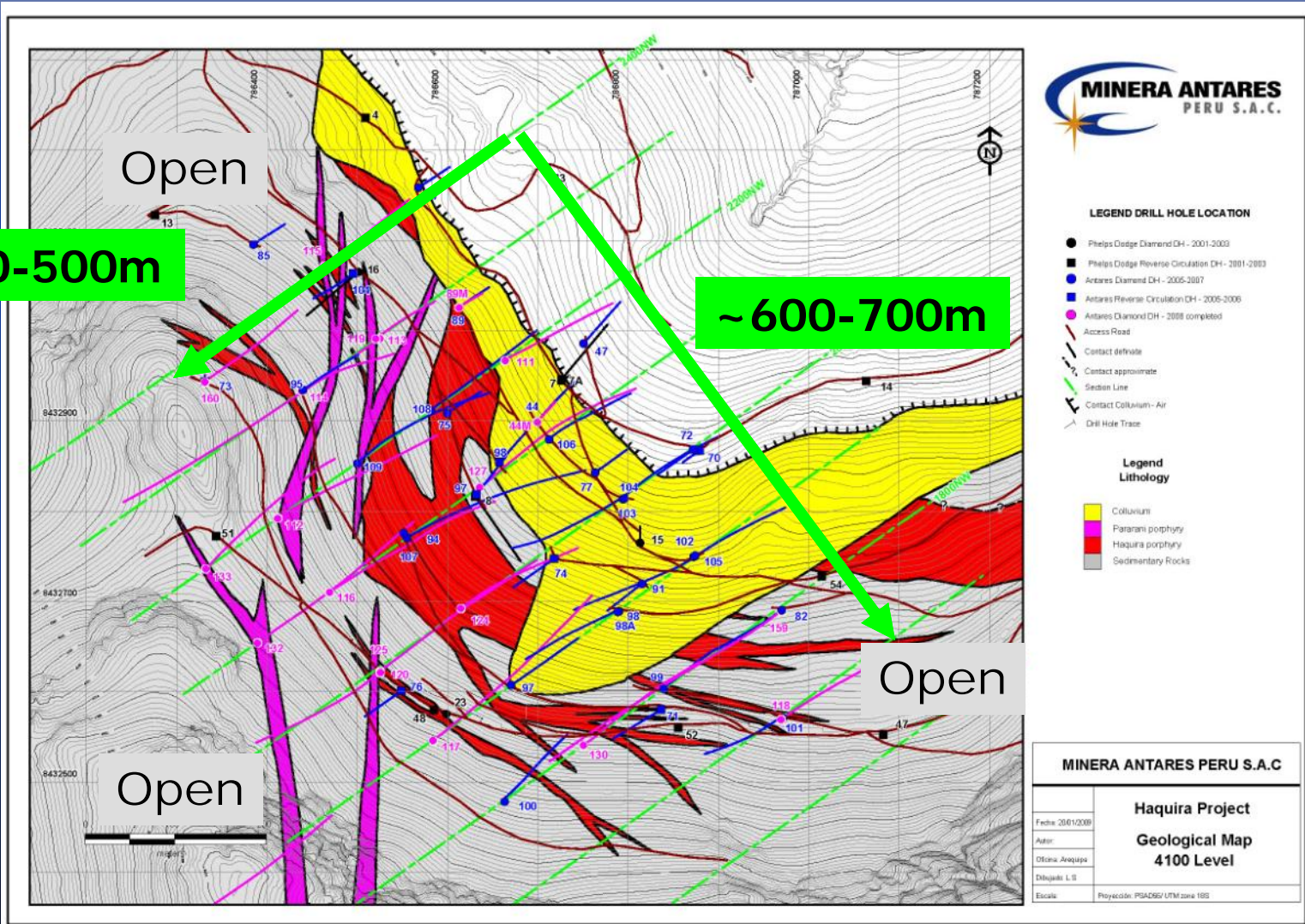
Open

Open

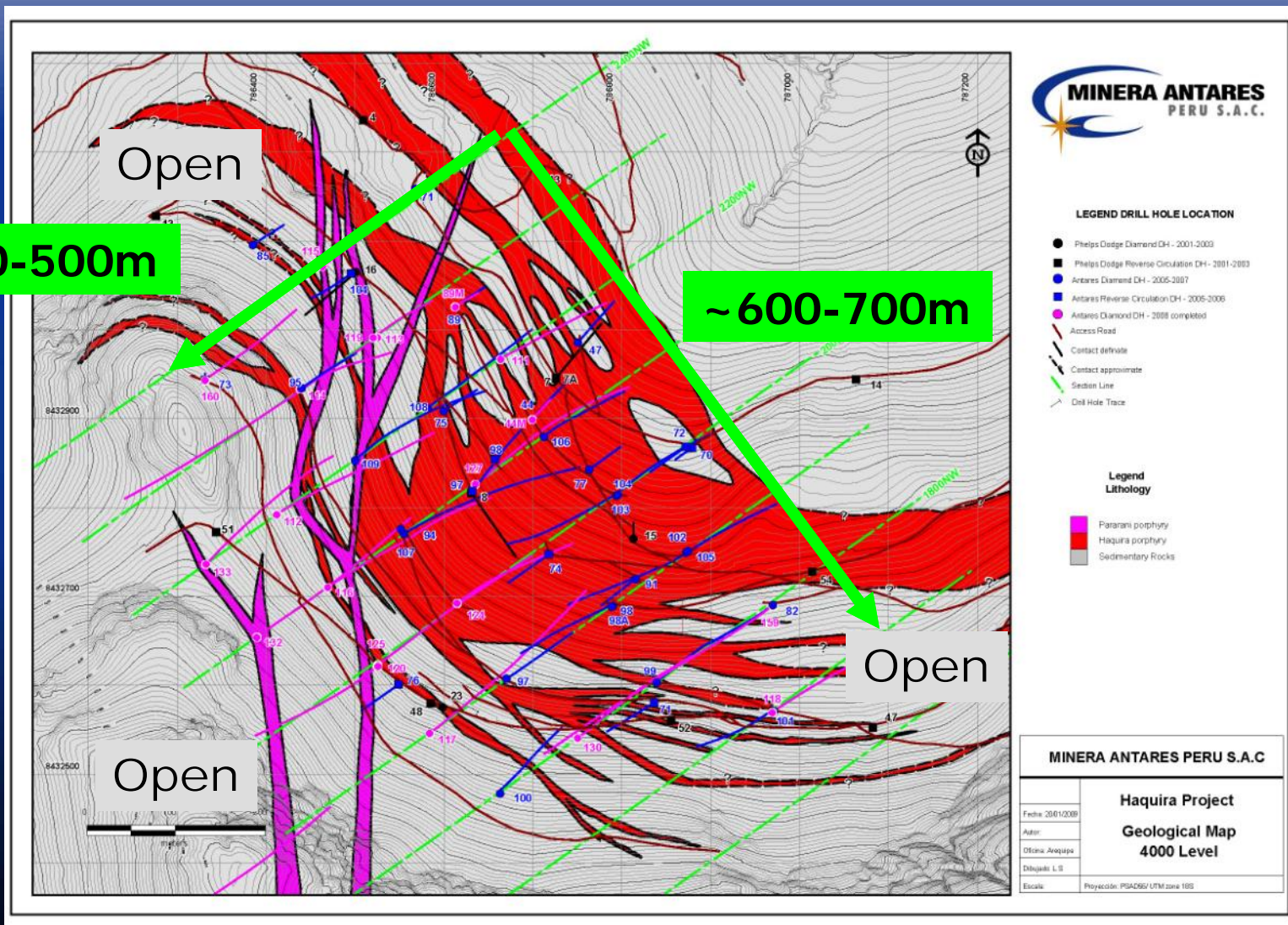
Open



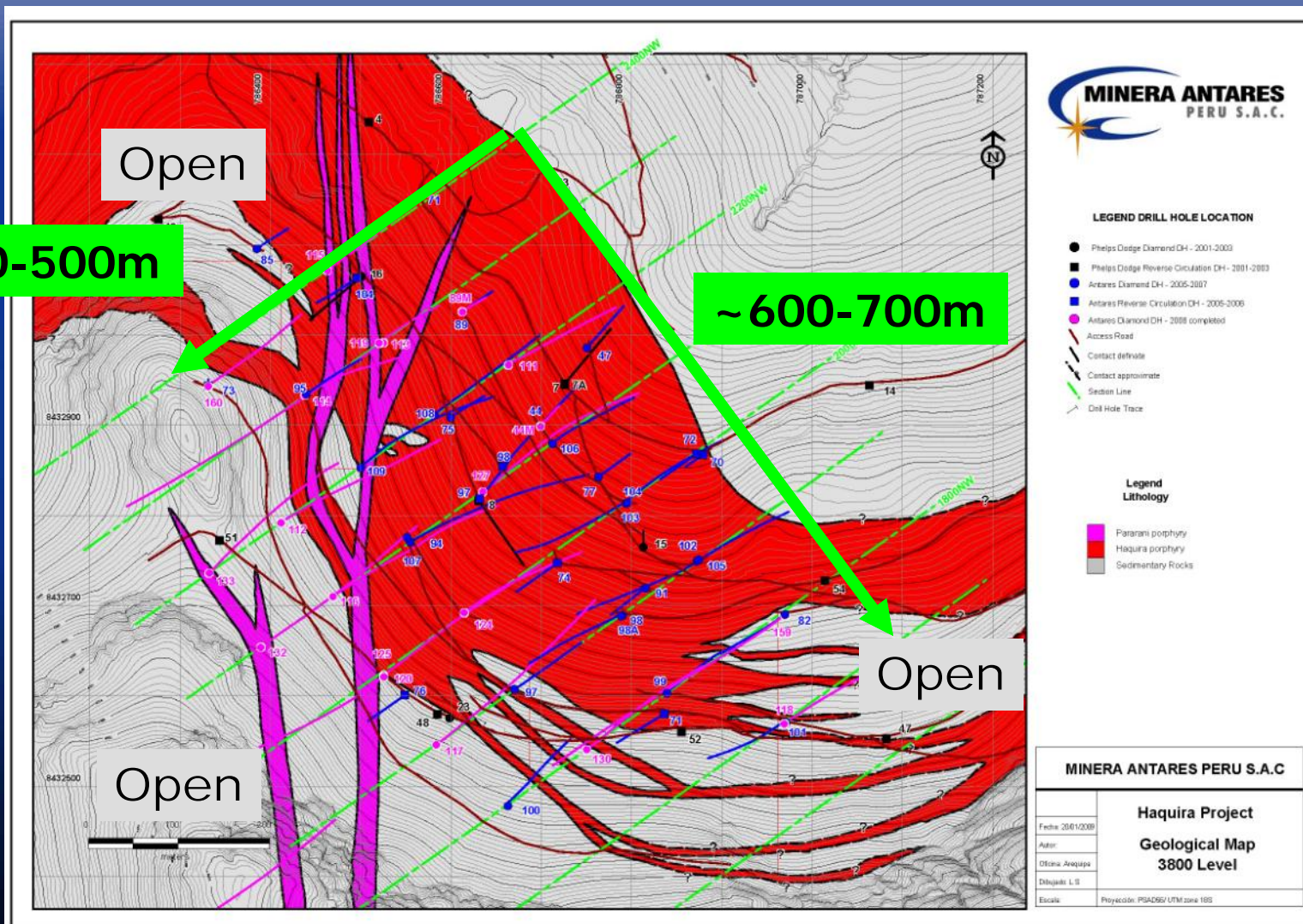
# Haquira East - Level Plans



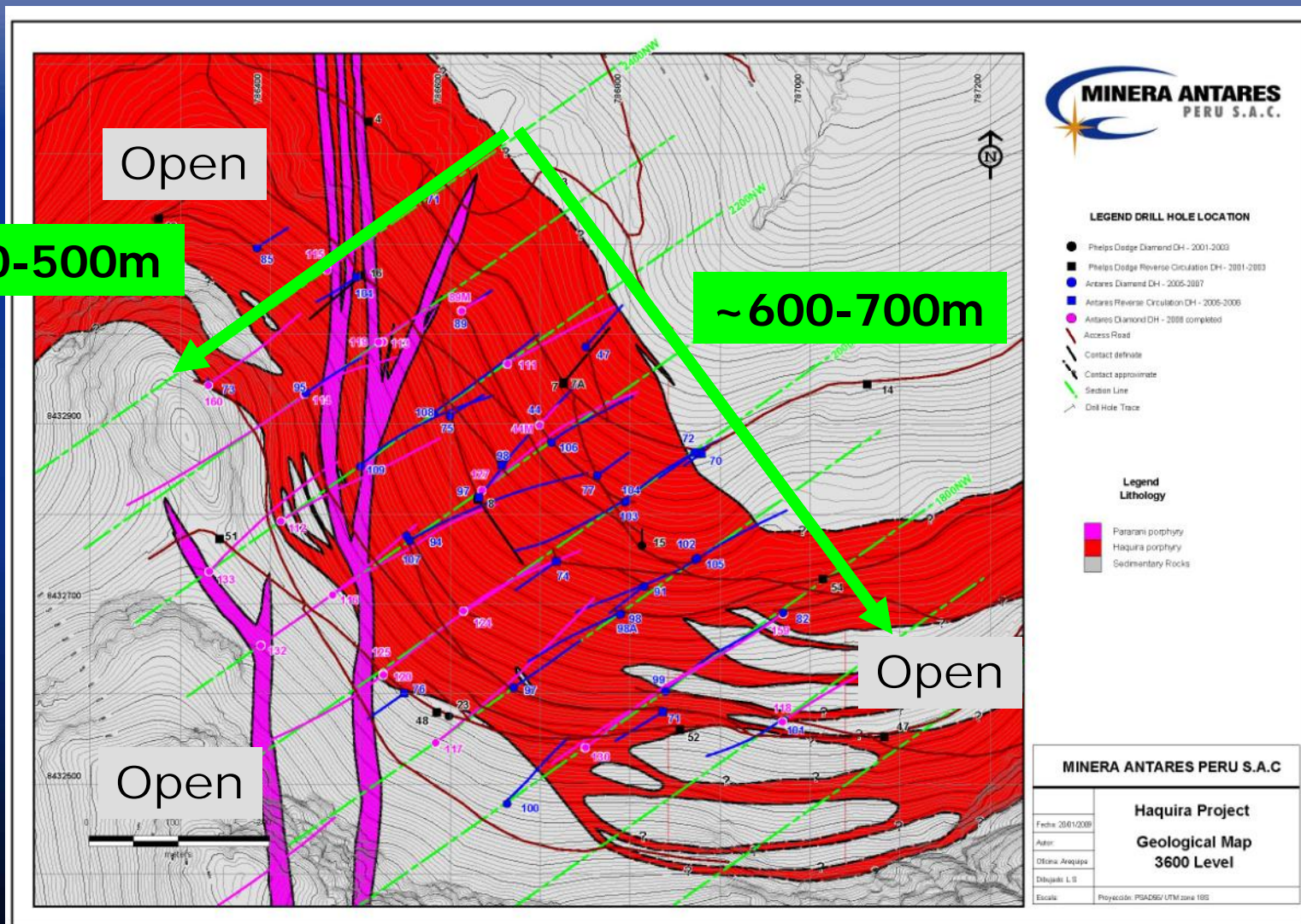










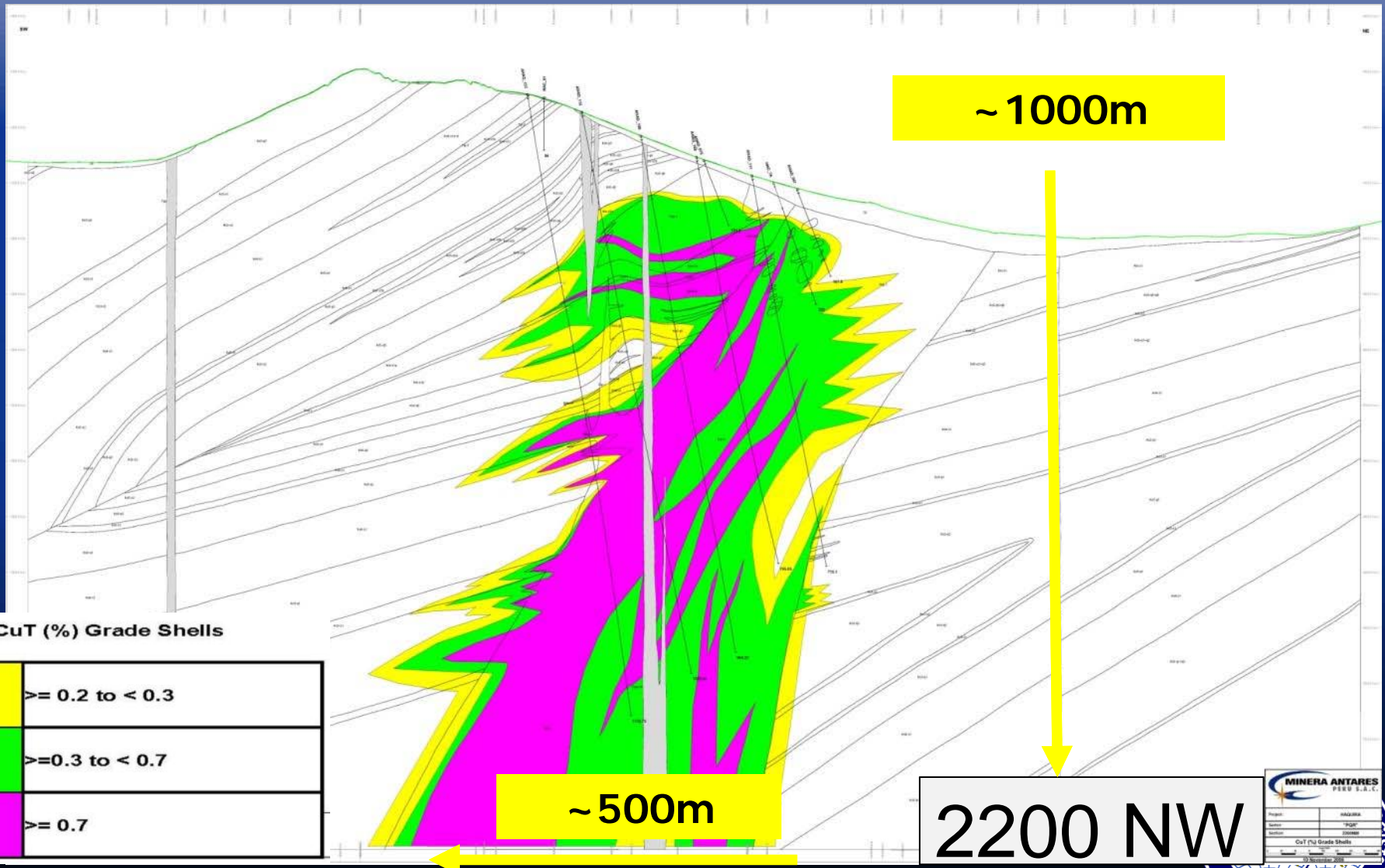


~ 400-500m

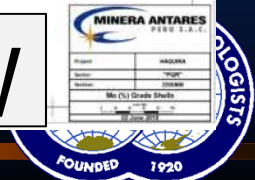
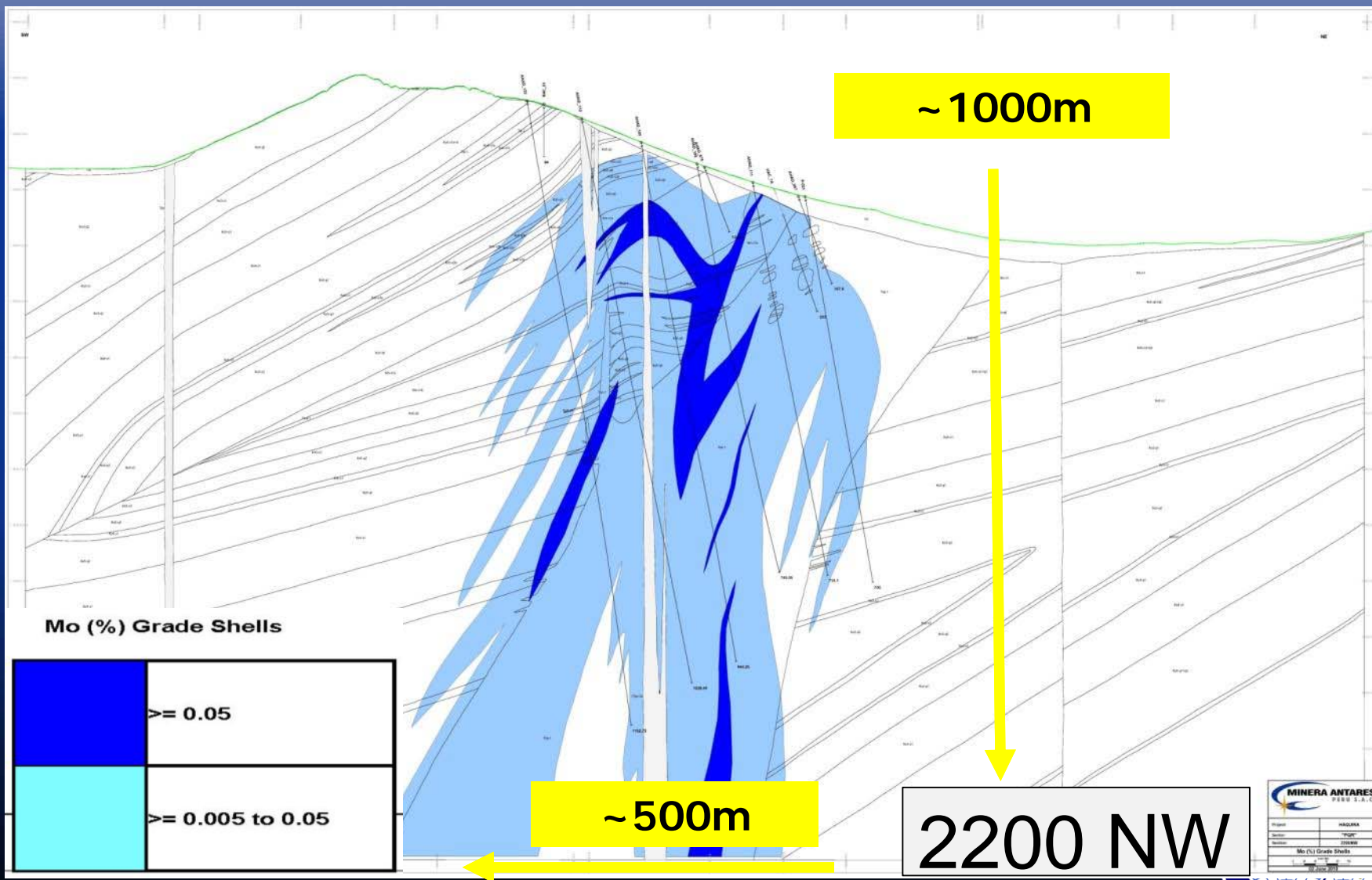
~ 600-700m



# Haquira East Cu (%) Grade Shells

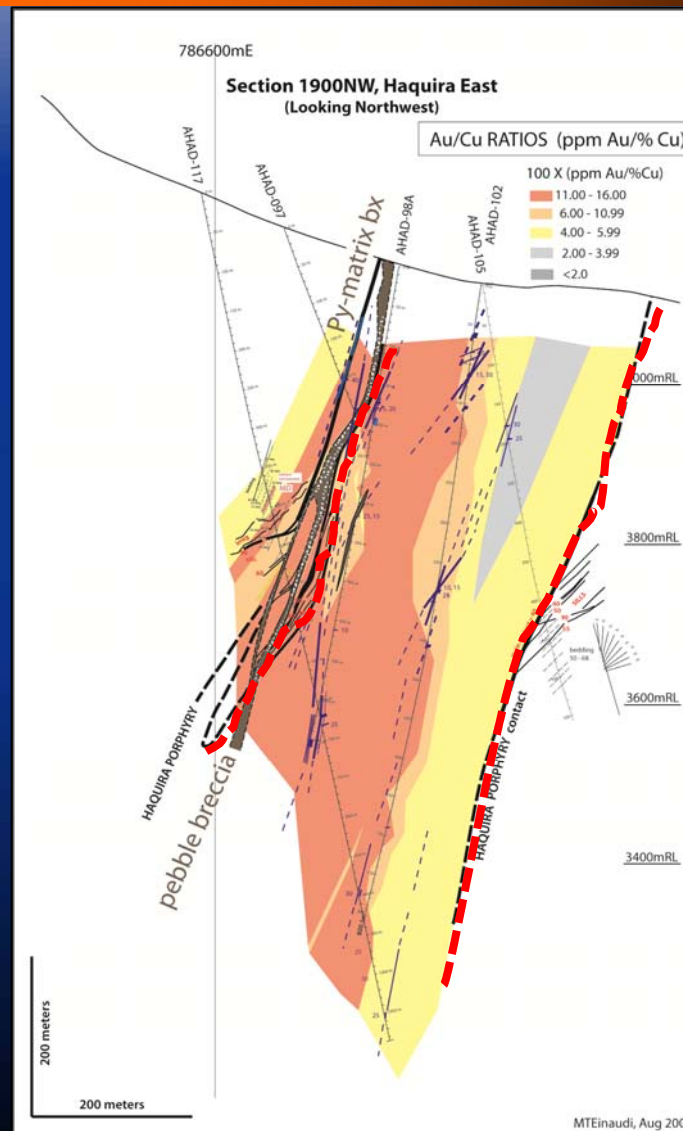
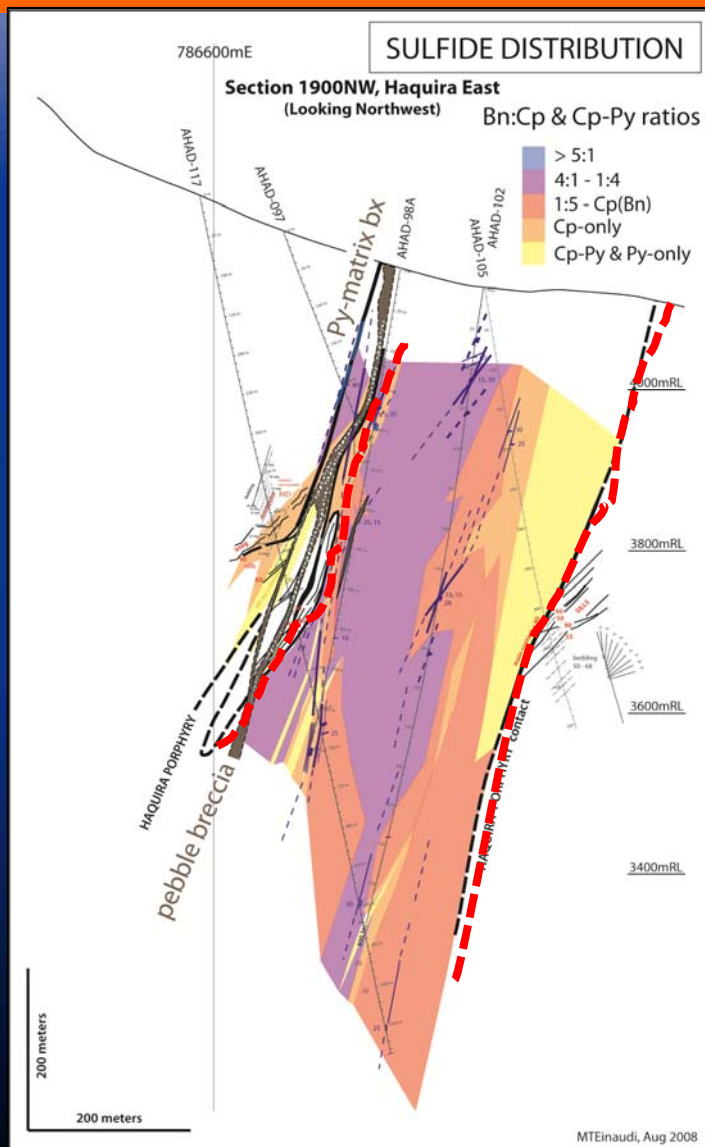


# Haquira East Mo (%) Grade Shells





# Sulphide Distribution & Au/Cu Ratio



# Haqira 2010 Resource Global Contained Cu & CuEQ

Haqira Global						
Secondary Cu (0.2% cut-off)	Tonnes	Cu (%)	Mo (%)	Au (ppm)	Ag (ppm)	CuEQ Grade
Measured	59.4	0.52				0.52
Indicated	155.6	0.44				0.44
Inferred	72.2	0.41				0.41
	287.2	0.45				0.45
Haqira Global						
Primary Cu (0.3% cut-off)	Tonnes	Cu (%)	Mo (%)	Au (ppm)	Ag (ppm)	CuEQ Grade
Measured	68.9	0.64	0.015	0.045	1.84	0.78
Indicated	285.7	0.63	0.014	0.044	1.78	0.76
Inferred	333.7	0.54	0.009	0.032	1.59	0.63
	688.3	0.59	0.012	0.038	1.69	0.70
Total Haqira (Sup + Hyp)						
	Tonnes	Cu (%)	Mo (%)	Au (ppm)	Ag (ppm)	CuEQ Grade
Measured	128.3	0.58	0.015	0.045	1.84	0.66
Indicated	441.3	0.56	0.014	0.044	1.78	0.64
Inferred	405.9	0.52	0.009	0.032	1.59	0.58
	975.5	0.55				0.62

5,326,100 Metric Tonnes Cu

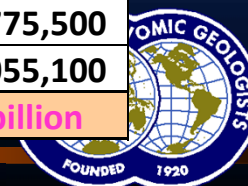
6,025,320 Metric Tonnes CuEQ

$CuEQ = Cu\% + (Au\ g/t \times 0.4862) + (Mo\% \times 10.00/1.50) + (Ag\ g/t \times 0.0077)$

$Cu = \$US\ 1.50/lb\ Au = \$US\ 500/oz\ Mo = \$US\ 10.00/lb\ Ag = \$US\ 8.00/oz$

Mea + Ind (lbs Cu)	7,090,001,100
Inf (lbs Cu)	4,654,049,400
<b>Contained lbs Cu</b>	<b>11.7 billion</b>

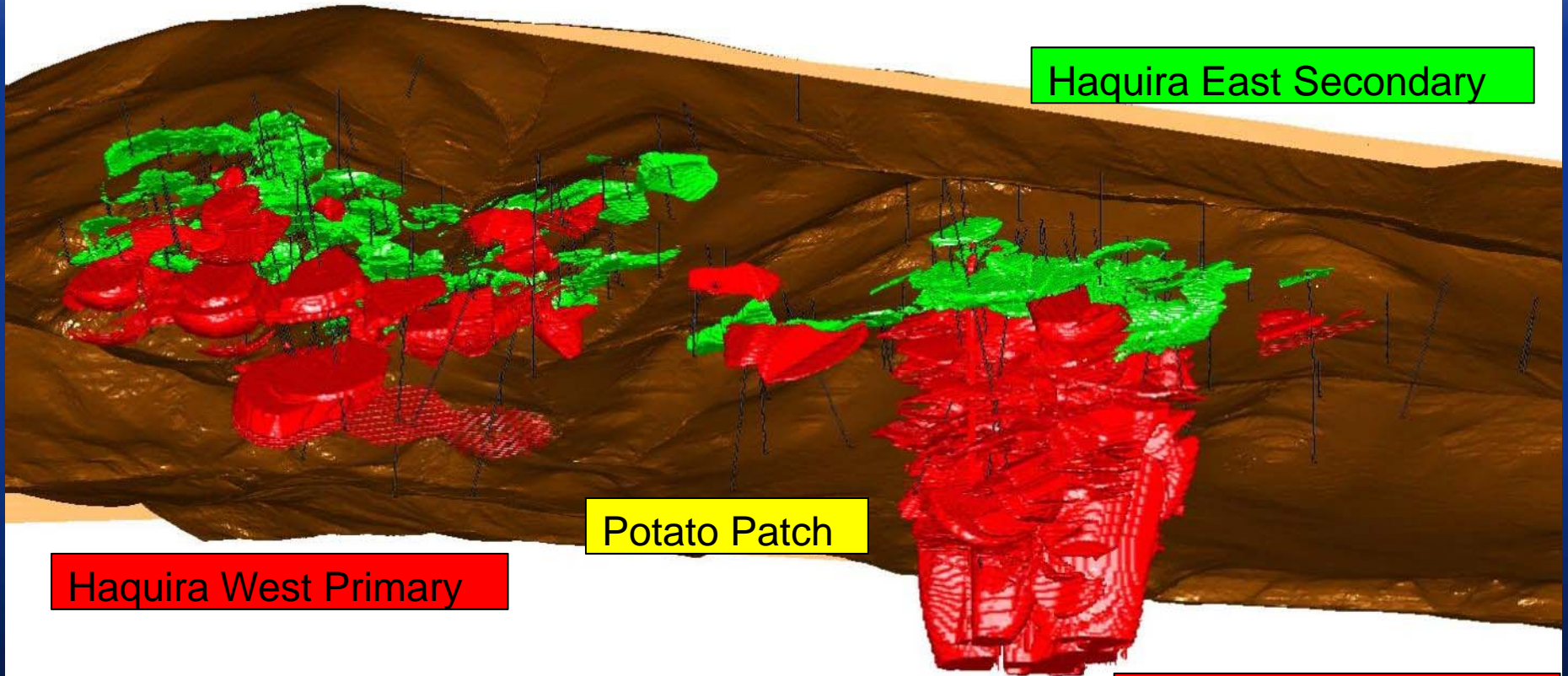
Mea + Ind (lbs CuEQ)	8,094,775,500
Inf (lbs CuEQ)	5,191,055,100
<b>Contained lbs CuEQ</b>	<b>13.2 billion</b>





Haqira West Secondary

Haqira East Secondary



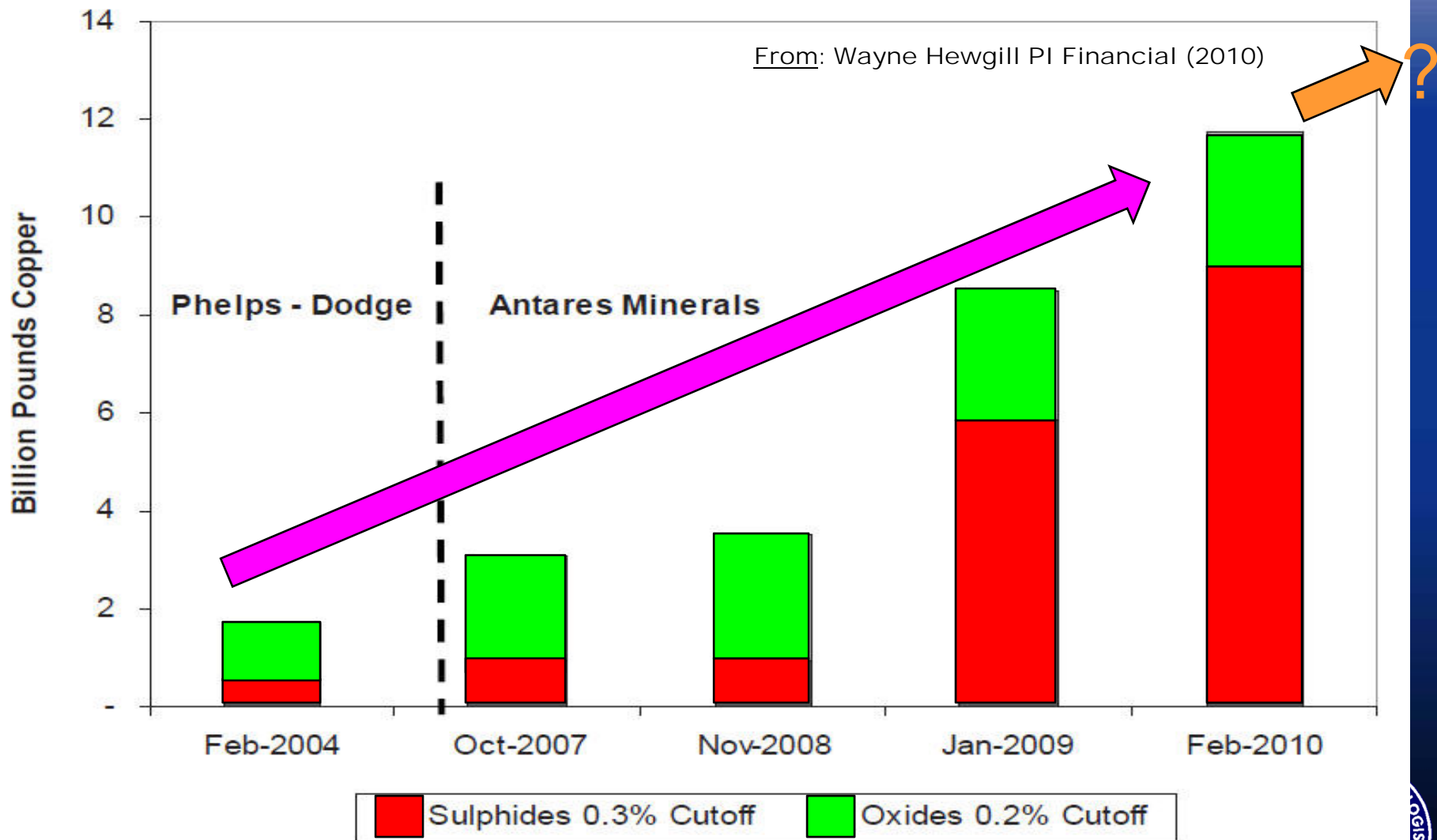
Haqira West Primary

Potato Patch

Haqira East Primary

# Haqira Resource Growth 2004 - 2010

From: Wayne Hewgill PI Financial (2010)





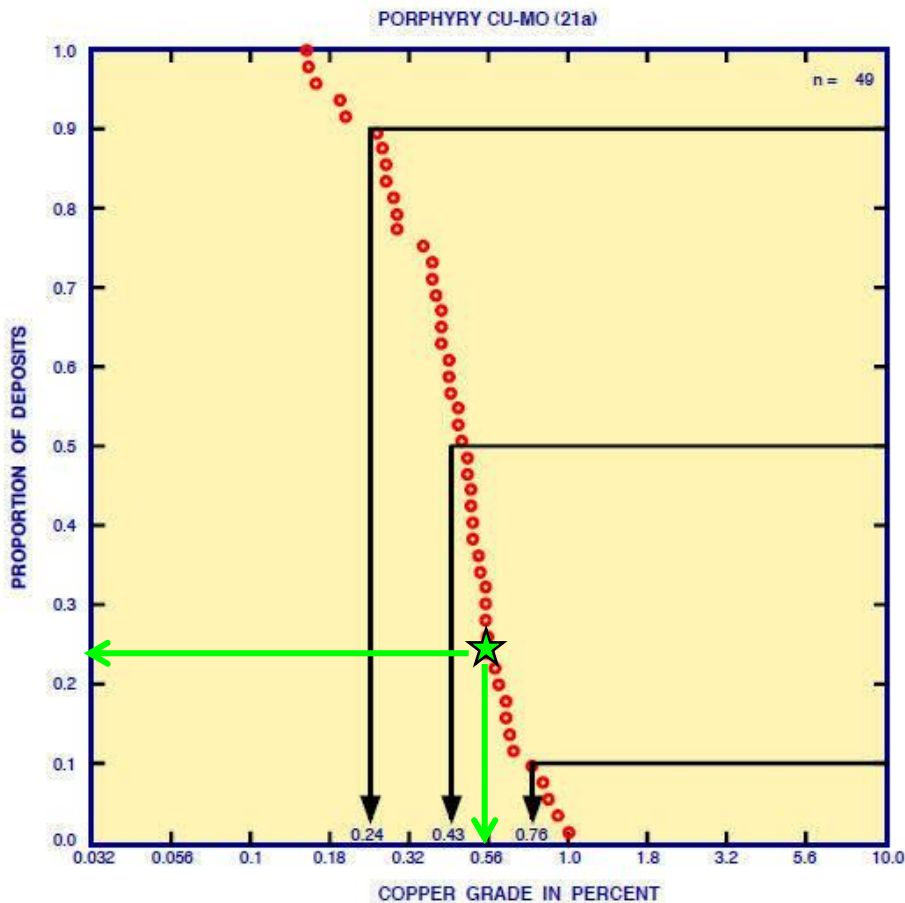


Figure 21. Cumulated frequency of copper grade of porphyry Cu-Mo (model 21a) deposits. Each dot represents an individual deposit. Intercepts for the 90th, 50th, and 10th percentiles of the lognormal distribution are provided.

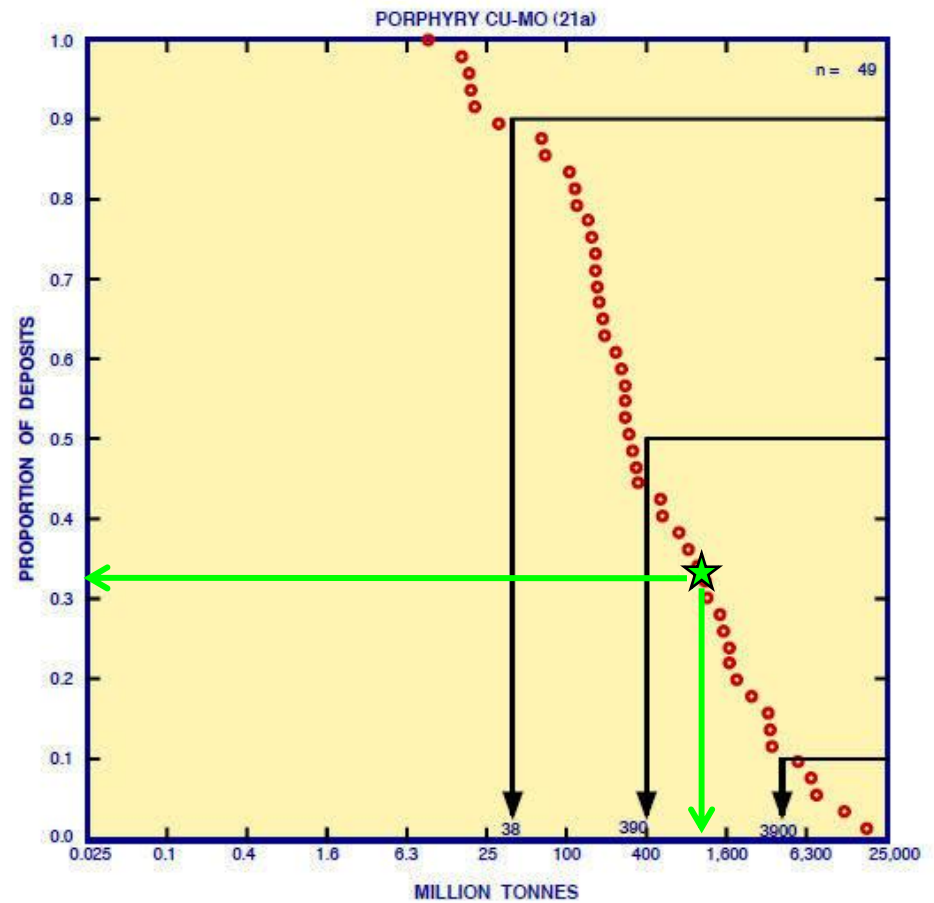
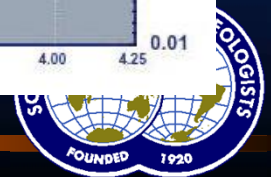
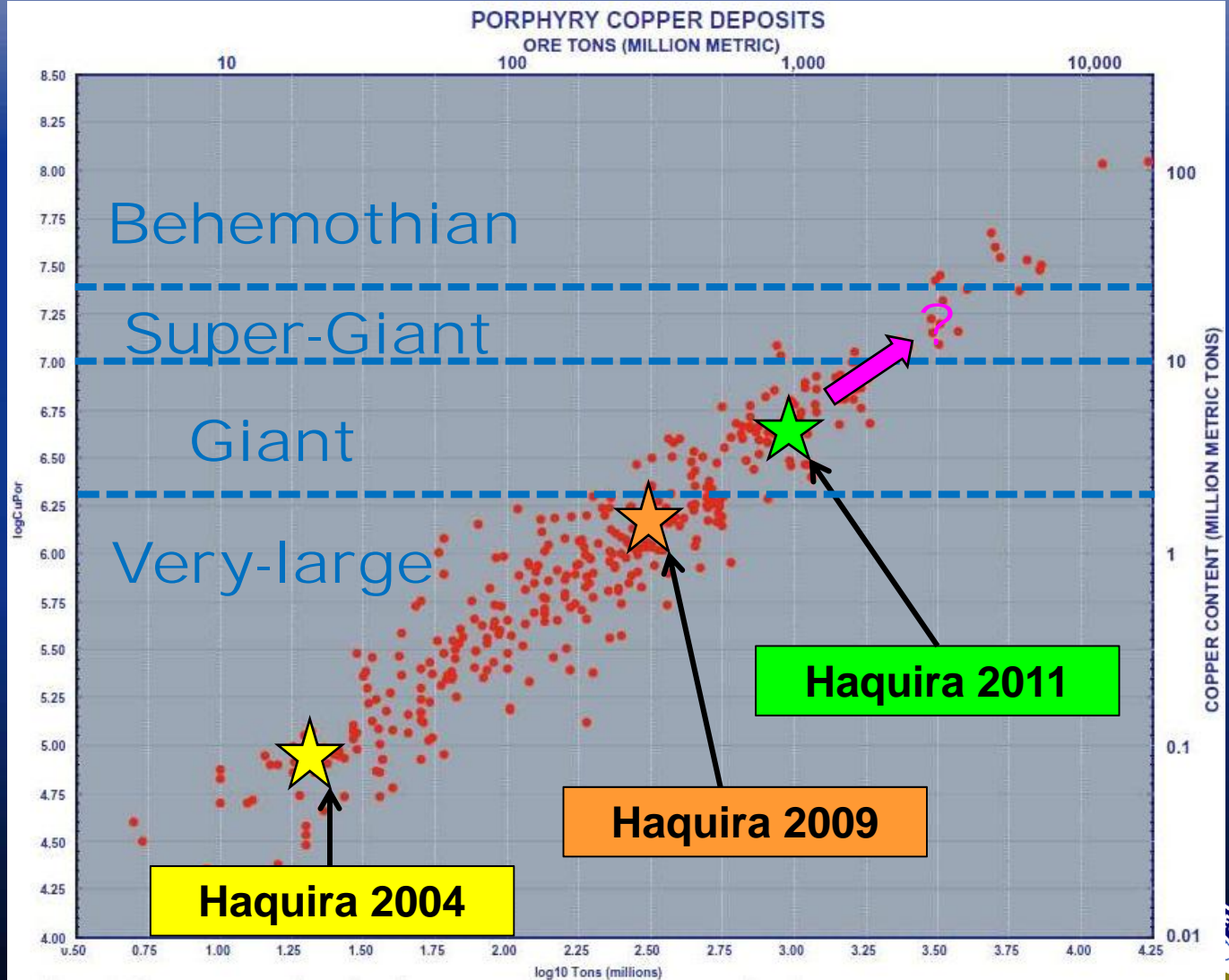


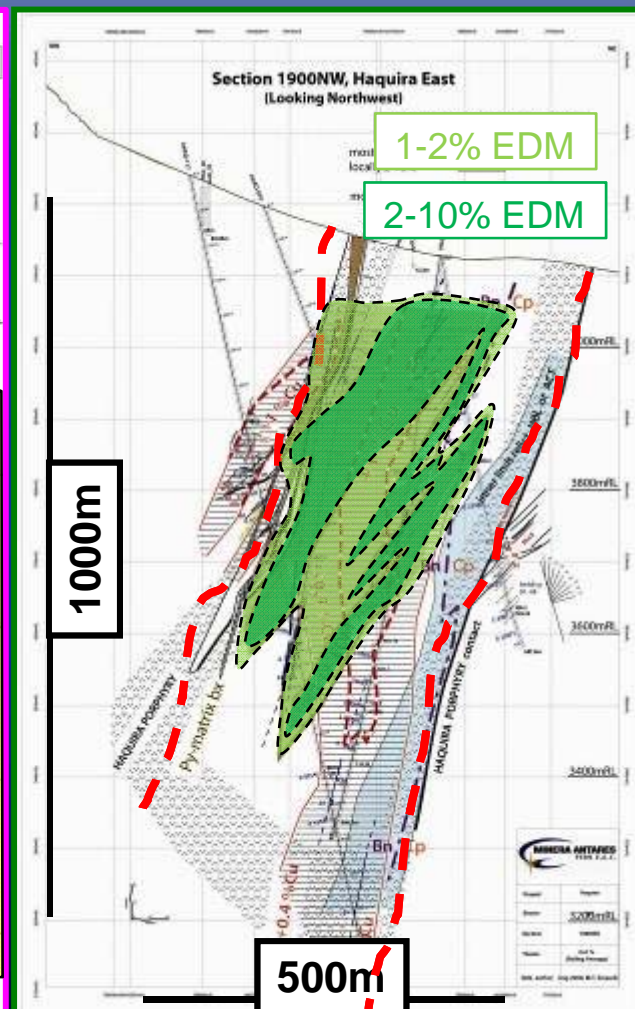
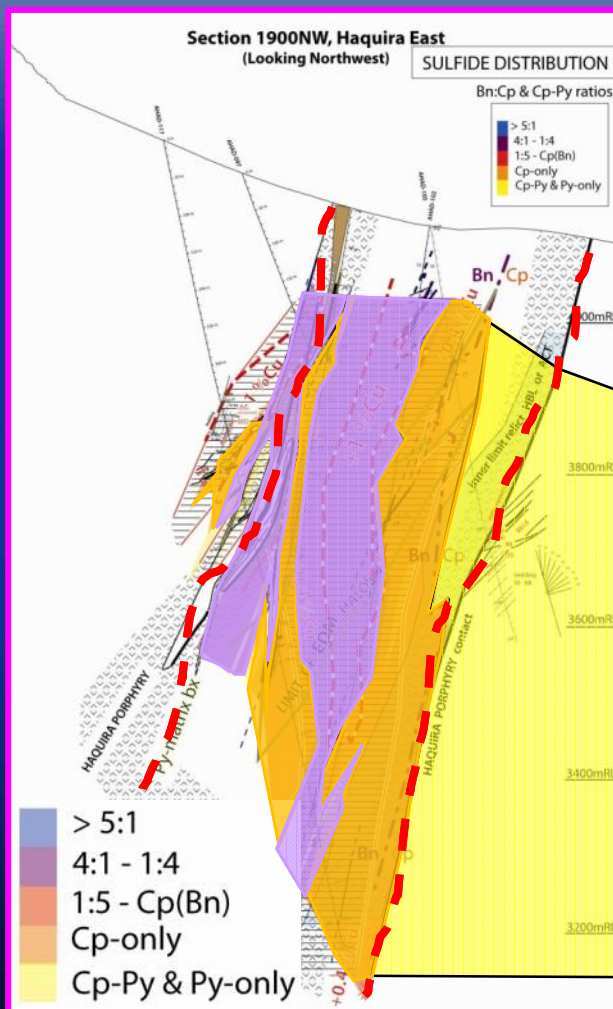
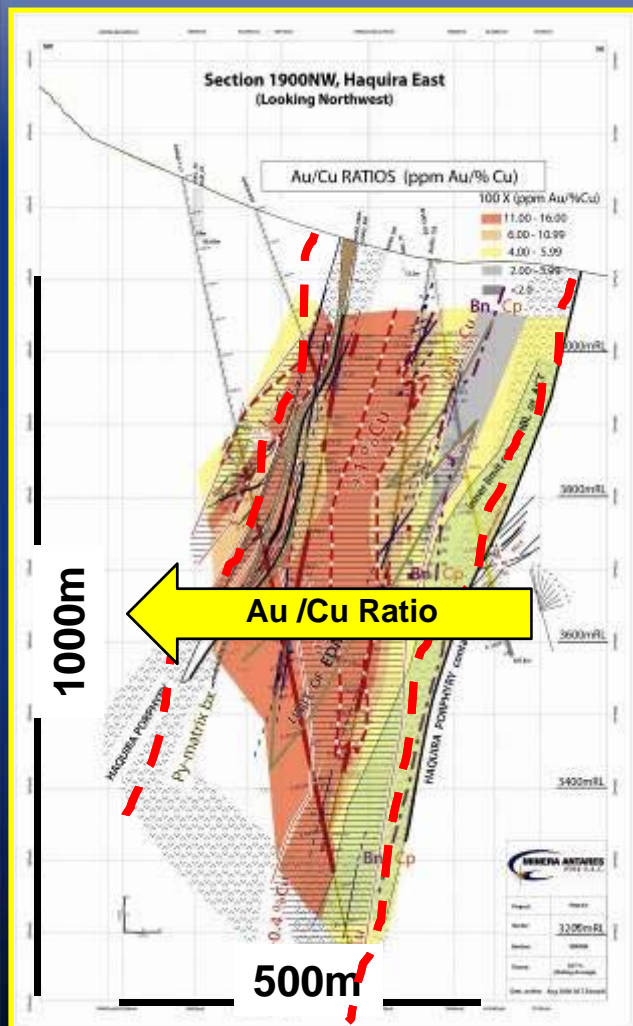
Figure 20. Cumulated frequency of ore tonnages of porphyry Cu-Mo (model 21a) deposits. Each dot represents an individual deposit. Intercepts for the 90th, 50th, and 10th percentiles of the lognormal distribution are provided.

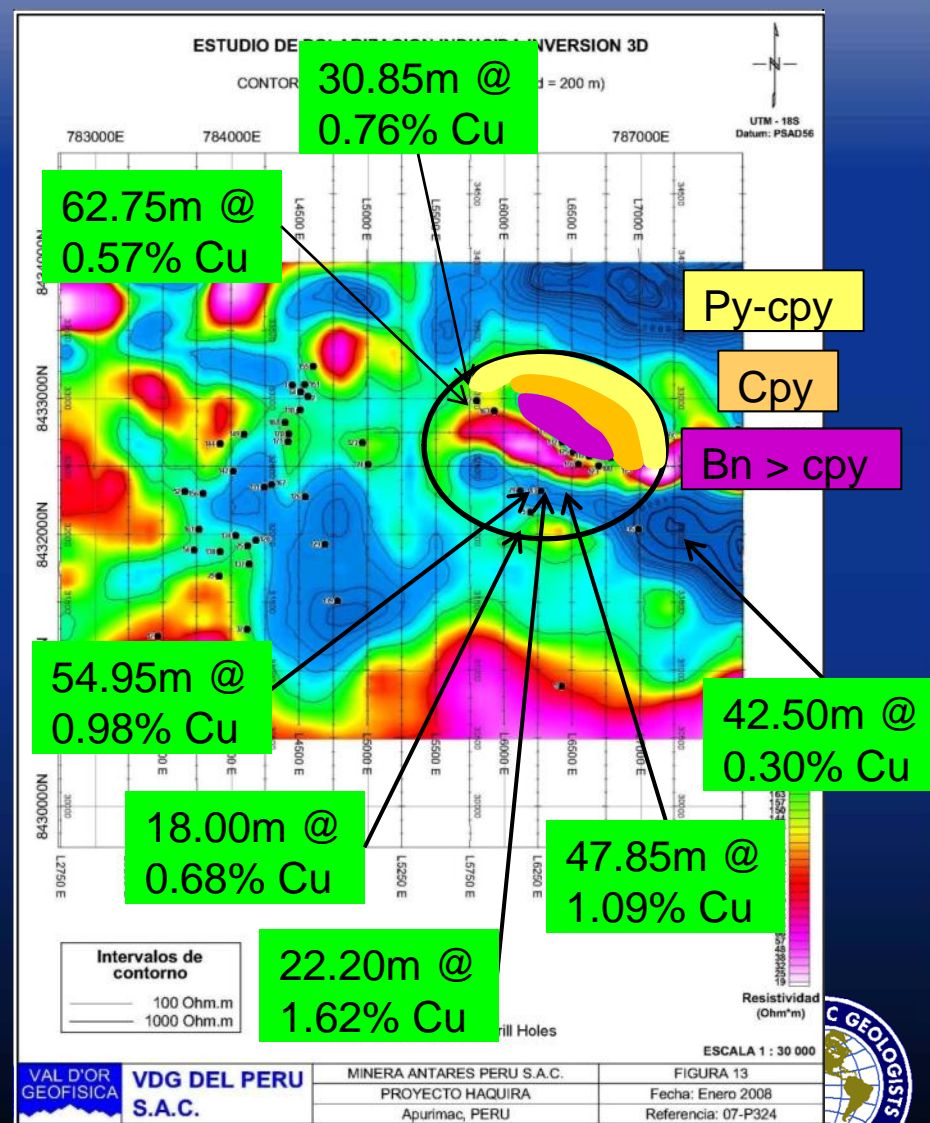
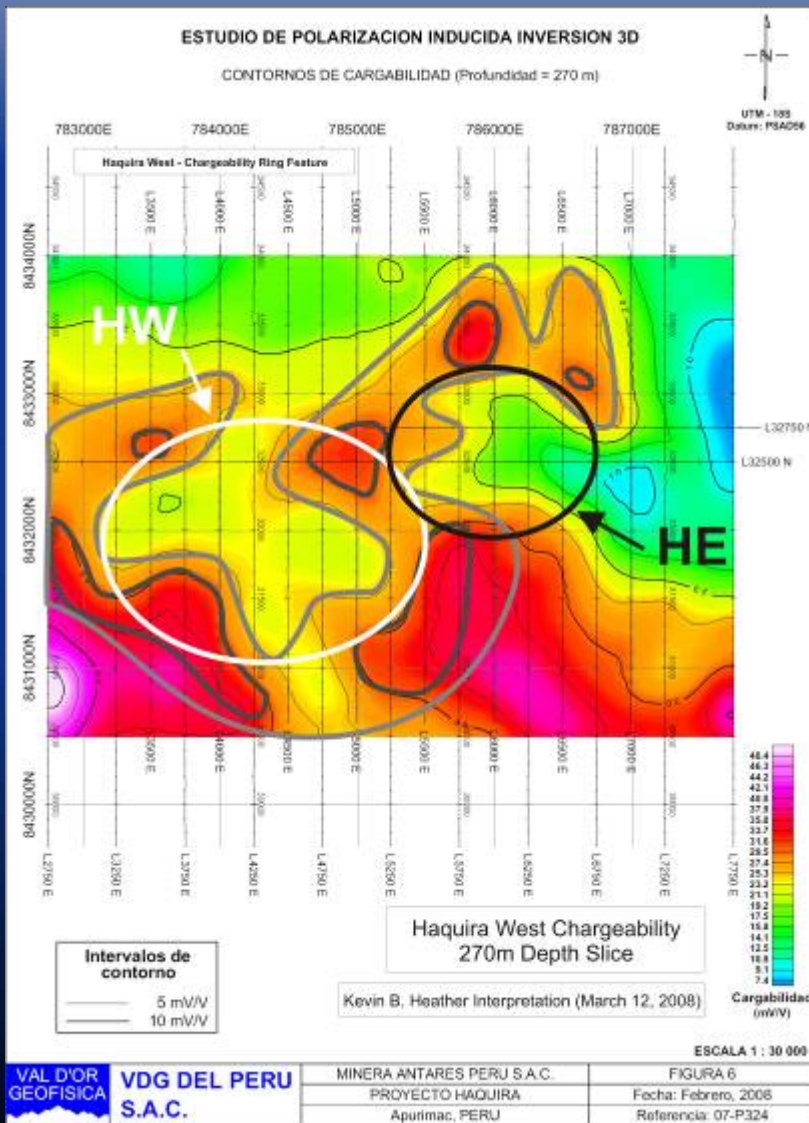
Modified from Singer et al. (2005)

Categories defined by Clark et al. (1993)











- 1) **The Haquira Cu-Mo-Au porphyry is an exciting new discovery within an emerging world-class Cu district in Peru**
- 2) **Early SX-EW operation followed by an open pit and possible underground mining of the primary sulphides**
- 3) **Impressive vertical extent to the mineralization**
- 4) **Large zones of higher-grades**
- 5) **Geological, geophysical & geomorphologic evidence suggest we have only found a portion of the deposit (open to NW, SE, SW and to depth)**
- 6) **Excellent exploration potential in adjacent targets**
- 7) **First Quantum Minerals is currently drilling & exploring adjacent targets**
- 8) **Lots geological work left to be done!**
- 9) **Haquira is a SUPER-GIANT in the making!**





# The Antares Team



Thanks for your attention



SEG Orange NSW Talk

27/06/2012

