



Zero Harm Dignity and Respect Sustainability Collaboration Excellence

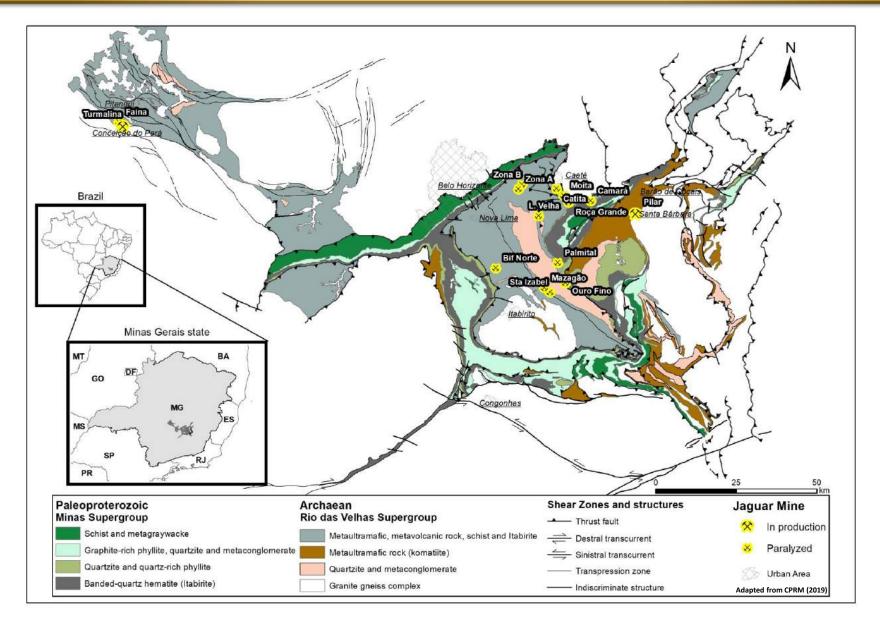
# Values-Driven Growth, Emerging Low Cost Producer

**Exploration Breakfast Presentation – March 2020** 



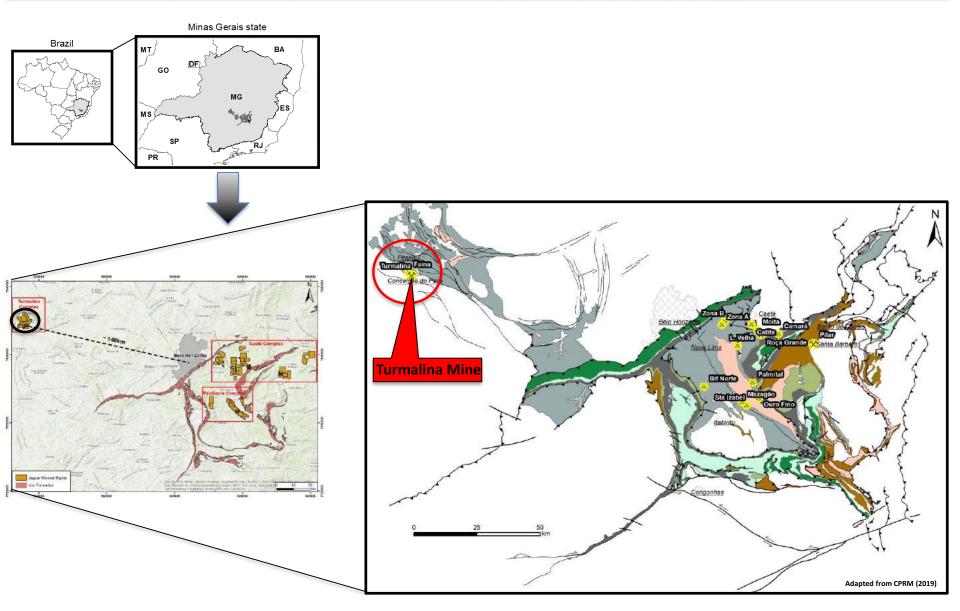
**TSX:JAG** 

#### Jaguar Mining: Archean Gold Deposits in the Iron Quadrangle



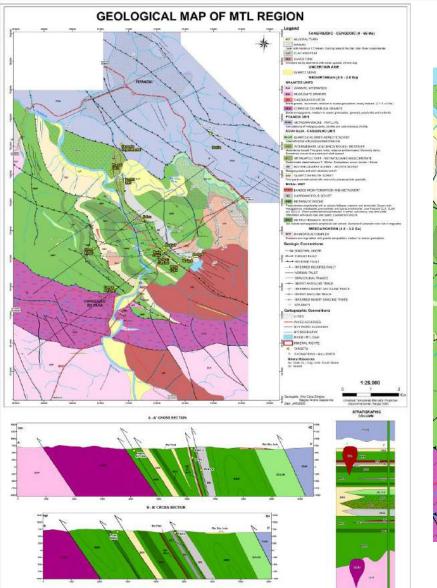
JAGUAR

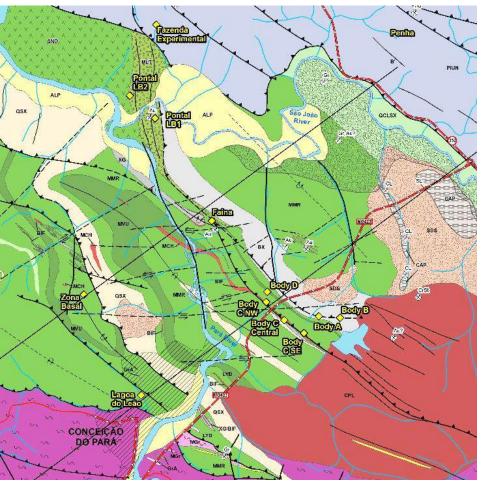
## **Jaguar Operations – Turmalina Mine**





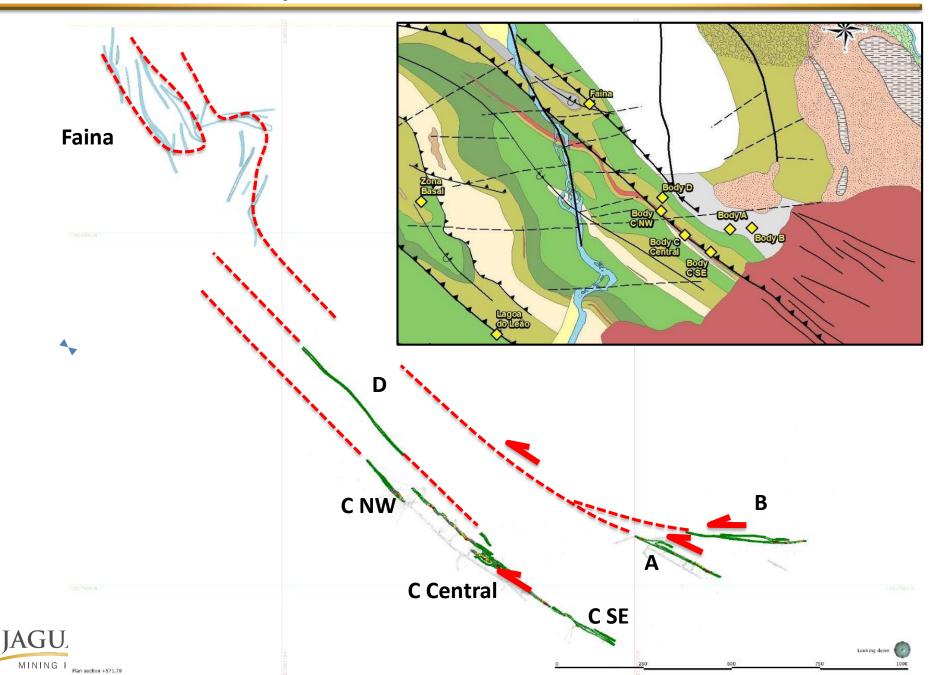
#### New geological map of Turmalina Mine area







## **Turmalina Mine – relative position of mineralized structures**



## **Turmalina Mine – Mineralization types**





#### Orebody A

- Sequence of biotite schist,
- Silicification with sulphides (arsenopyrite, pyrrhotite and pyrite)
- Disseminated within foliation and microfractures.
- Gold in association with As, Ag and Bi.
- 250m strike, average thickness 6m (range of 2m to 20m),
- Average gold grade of 6.55g/t.

#### Orebody B

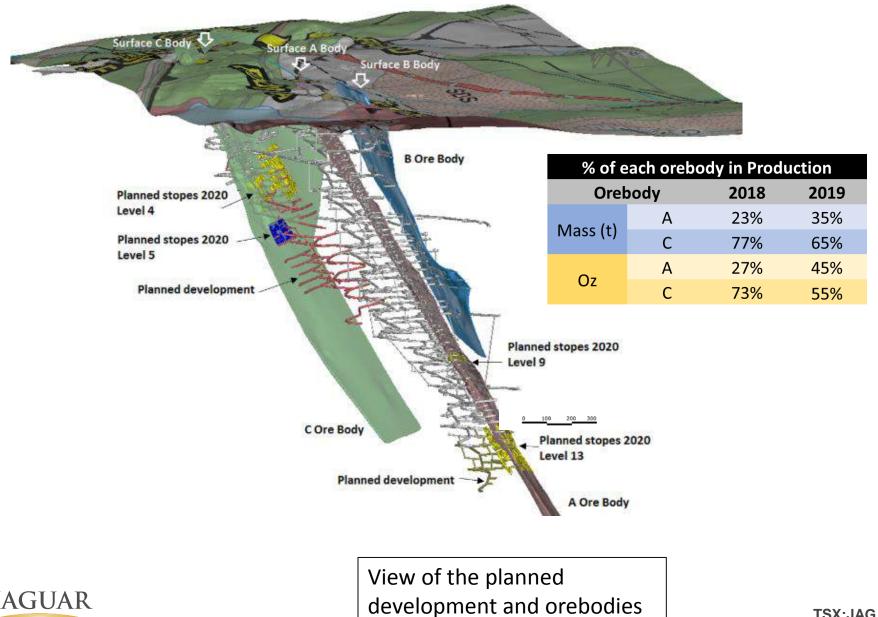
- Sequence of garnet biotite schist,
- Silicification and sulphides (arsenopyrite, pyrrhotite and chalcopyrite)
- Disseminated in foliation.
- 300m strike, average thickness of 2.5m (range of 2m to 3m)
- Average gold grade of 3.75g/t but has high grade shoot component.
- Targeting high grade shoot within an inflection zone near granitic intrusion, where the orebody direction is NE-SW, dipping 70° to NW.



#### Orebody C

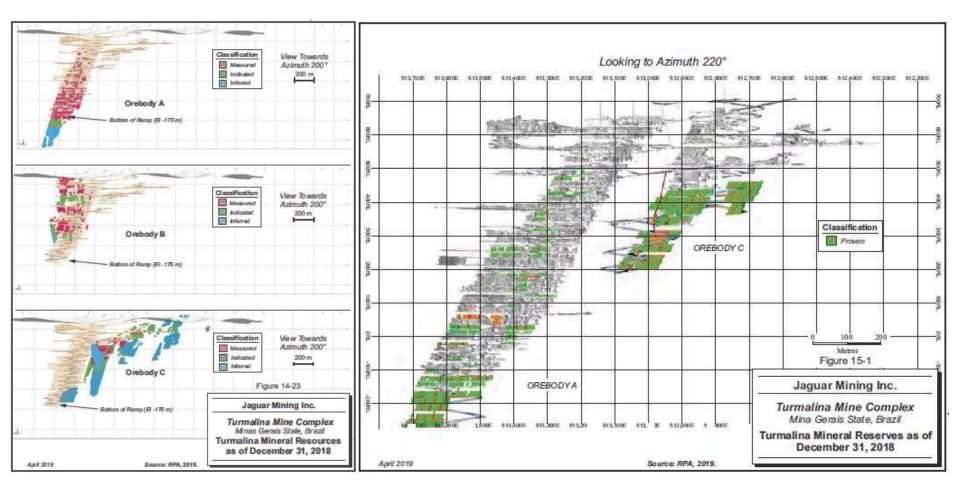
- Sequence of ferruginous metachert, BIF and carbonaceous schists.
- Disseminated sulphidation following the foliation and associated with silicification
- Main sulfides are arsenopyrite, pyrite, pyrrhotite, chalcopyrite, sphalerite, galena and berthierite.
- Main gold association with As, W, Sb and Bi.
- 800m strike, divided in 3 portions: C-NW, C-Central and C-SE.
- Average thickness of 3m (range of 2m to 15m) and average gold grade of 4.62g/t.





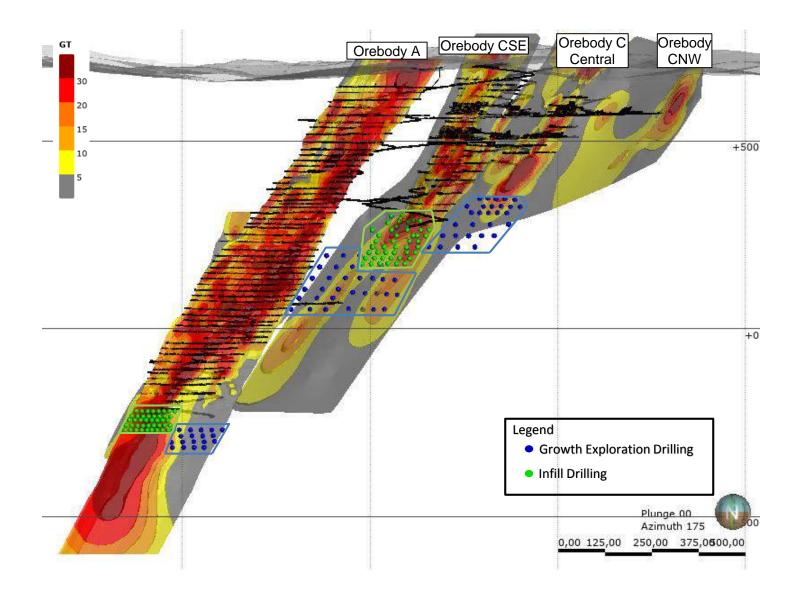
**TSX:JAG** 





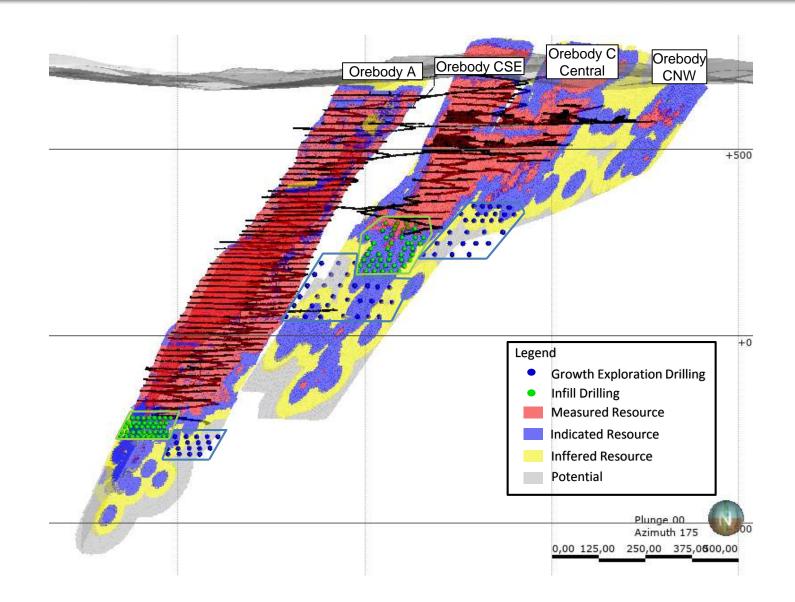


#### Turmalina Mine grade x thickness long section with planned 2020 drilling



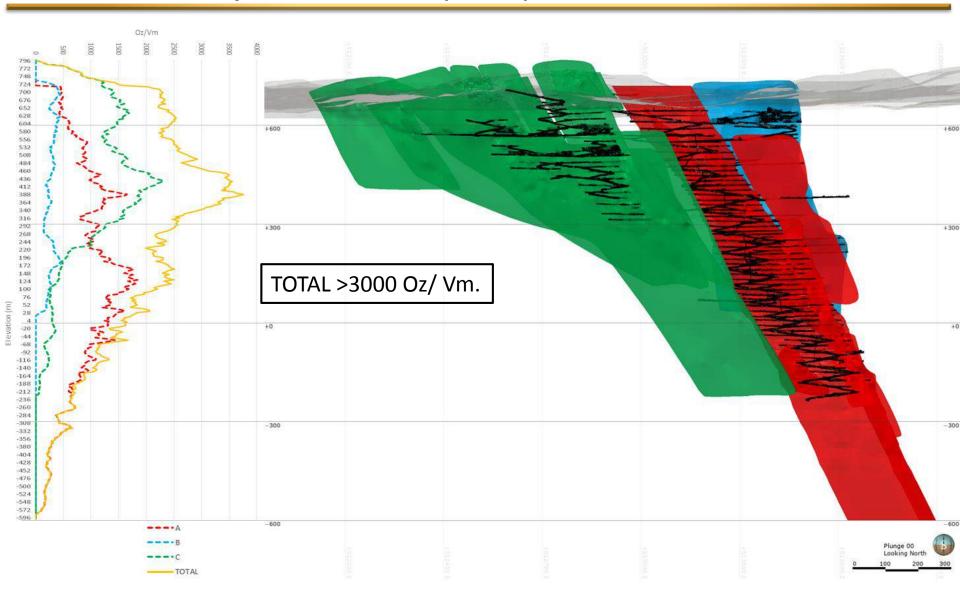


#### **Turmalina Mine Resources long section with planned 2020 drilling**



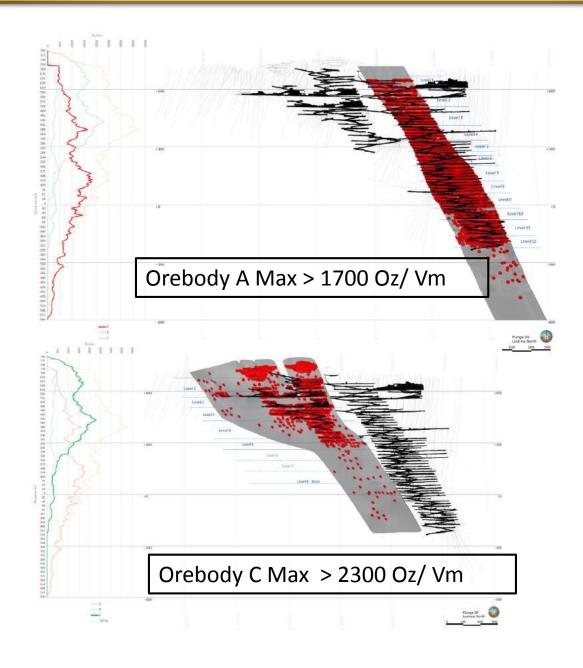


#### Turmalina Ounces per vertical meter (Oz/Vm) all orebodies

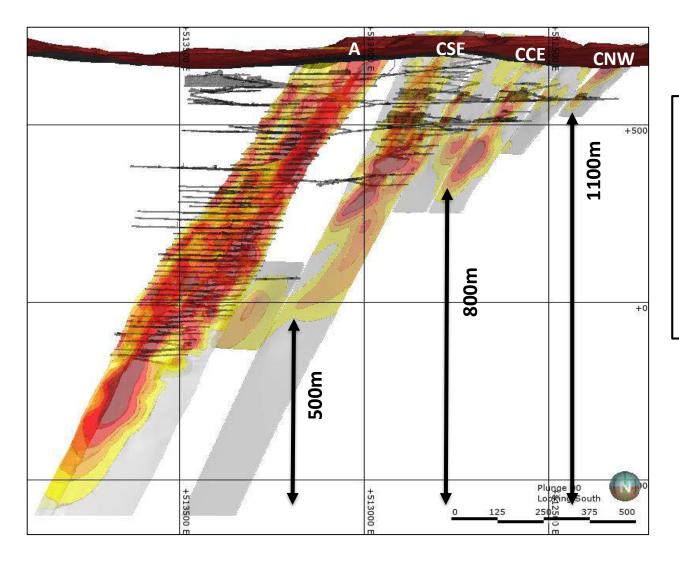




#### Oz / Vm Resources Orebody A and Orebody C versus drilling density







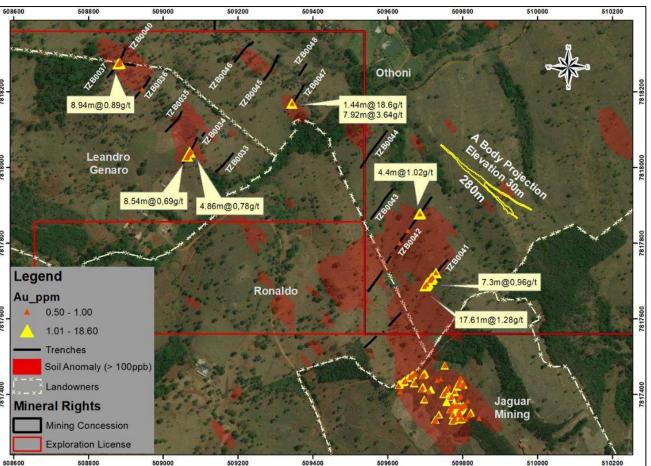
Search Space on Orebody C Structure has >1.5M Oz

Endowmnent Potential considering known Ounce per vertical meter profile



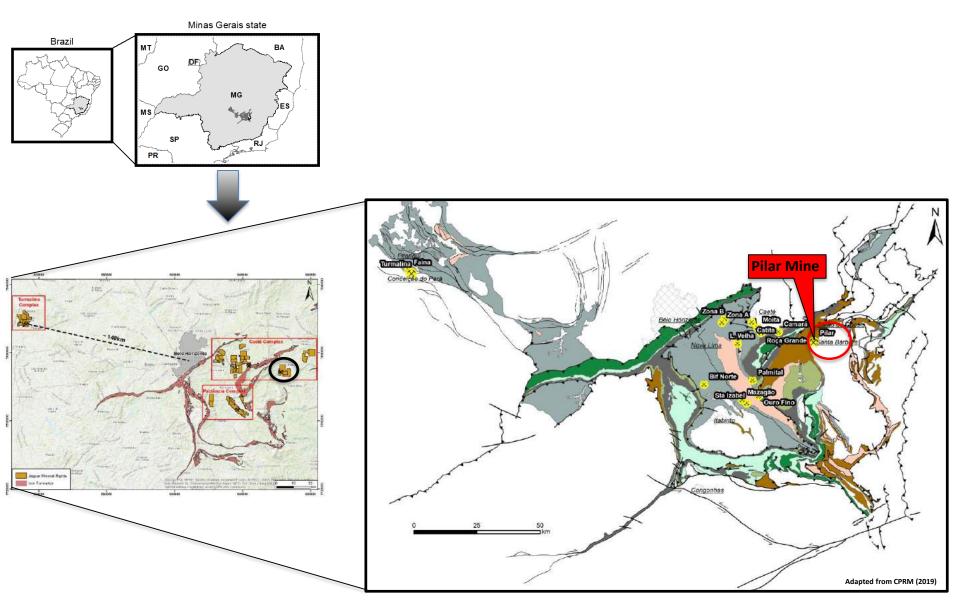
#### Turmalina – Zona Basal Target







## **JAGUAR OPERATIONS – PILAR MINE**



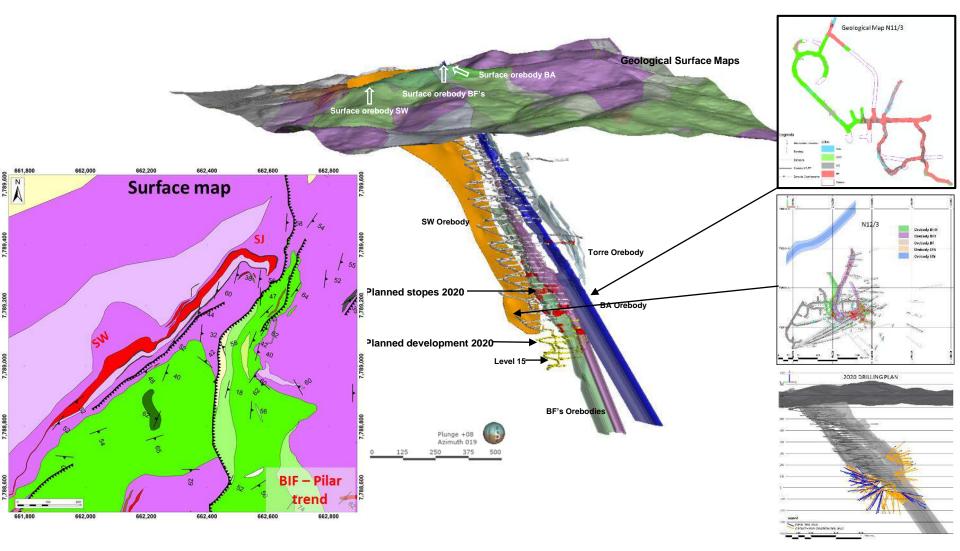




#### 657,500 660,000 662,500 665,000 7,792,500 7,792,500 PP1mic Santa PP1 (sq) (2 Bárbara (sq) X 7,790,000 7,790,000 São Bento N34al Mine (CDS II) **Pilar Mine** ENd ENd N34al A3rnsq A3rnsq 7,787,500 7,787,500 Á4ma A4mcs A3msg A4rncs N230 A3rnsq A3rnsq N34al **Geologic structures** Córrego do 7,785,000 ,785,000 Reverse shear zone Sítio Mine (CDS I) A4rncs Inferred geological contact 665,000 662,500 657,500 660,000

#### **Pilar Geological Map with location of Operations and Occurrences**

#### **Pilar mine**





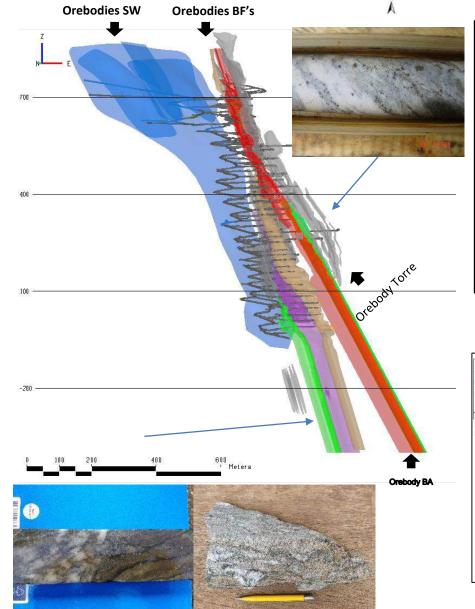
## **Pilar Mine – Mineralization types**

#### **BIF OREBODIES**

BF, BF2, BF3, BA, LPA and SW

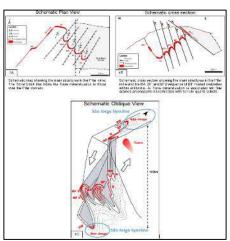
- **BIF Sequence** (layers of carbonate, quartz, silicates, and oxides).
- **Carbonates** (ankerite, dolomite, and siderite)
- Silicates layers comprise chlorite, sericite, and albite.
- Oxides layers comprise magnetyte, and hematite.

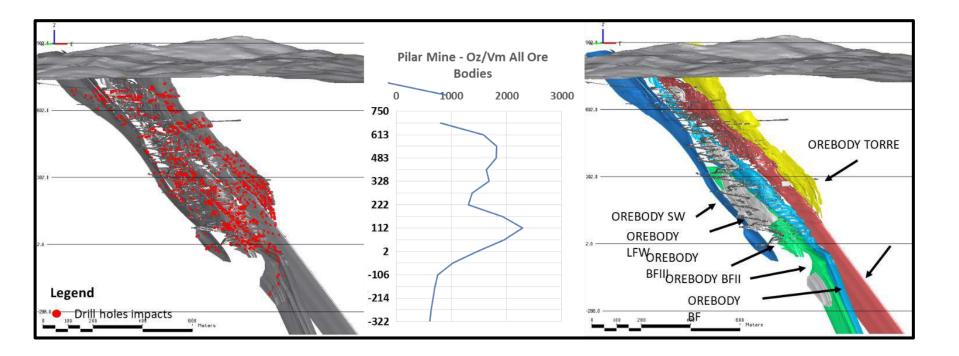
Sulphides (arsenopyrite and pyrrotite), (massive sulfide or disseminated zones) in BIFs or disseminated around quartz veins.



#### **TORRE Mineralization**

- Hydrothermally altered Metamafic
  Schists (quartz, chlorite, albite, carbonates, biotite and sericite)
- Sulphides arsenopyrite and pyrrotite that occur disseminated or with quartz veins.





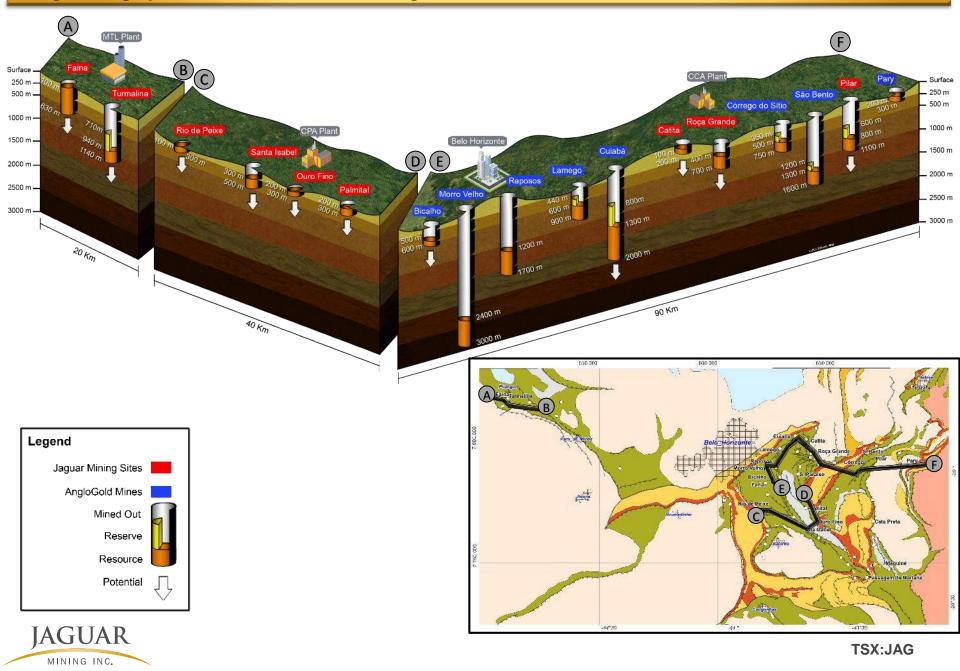
Pilar Max > 2000 Oz/ Vm



- Leverage cashflow from operations and solid Resource and Reserve Inventory to support sustainable production and organic growth through Exploration.
- Growth Exploration continue with disciplined and focused exploration of target portfolio within Jaguars Strategic Tenement Package.
- □ Monitor Business Development Opportunities.



Schematic section: Resources and Reserves, and down-plunge continuities - Jaguar's operations and neighboring operations in the Iron Quadrangle district







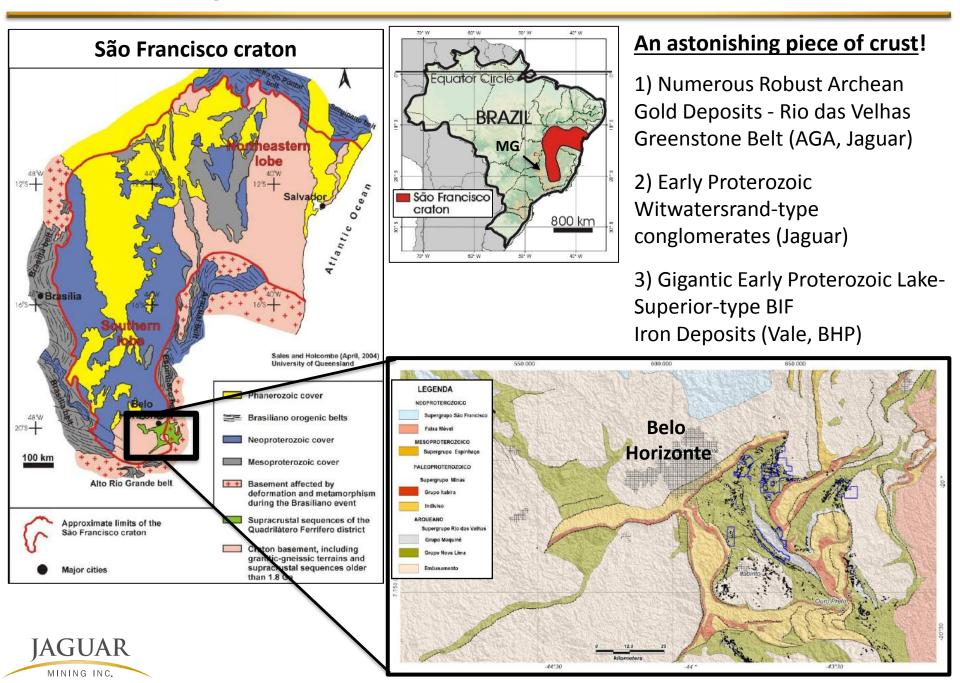
The Iron Quadrangle – Leveraging Jaguar´s position in a World Class Greenstone Terrane Márcio Sales

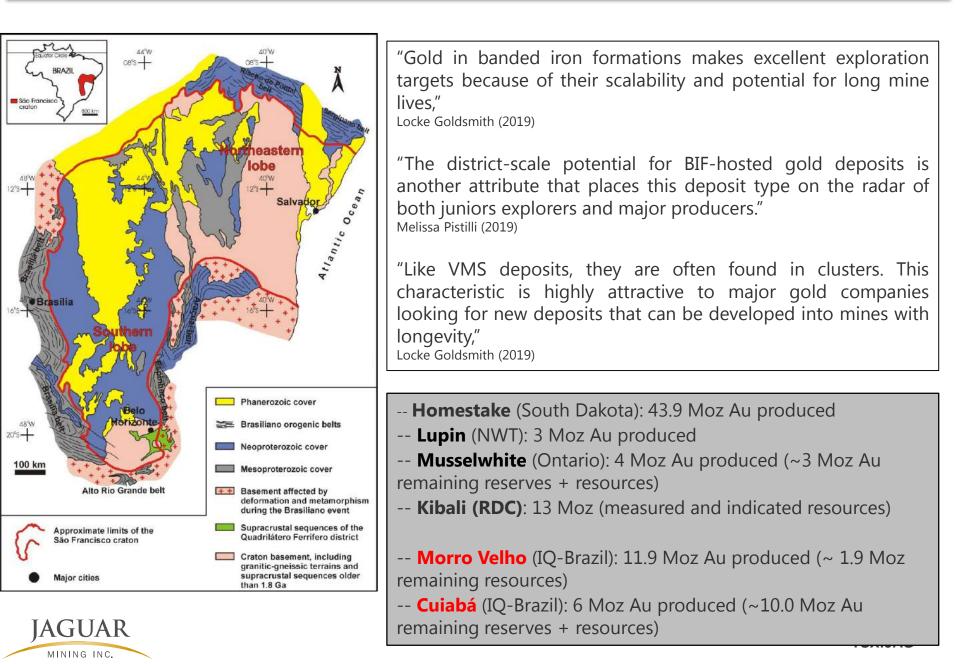
Consulting Geologist



**TSX:JAG** 

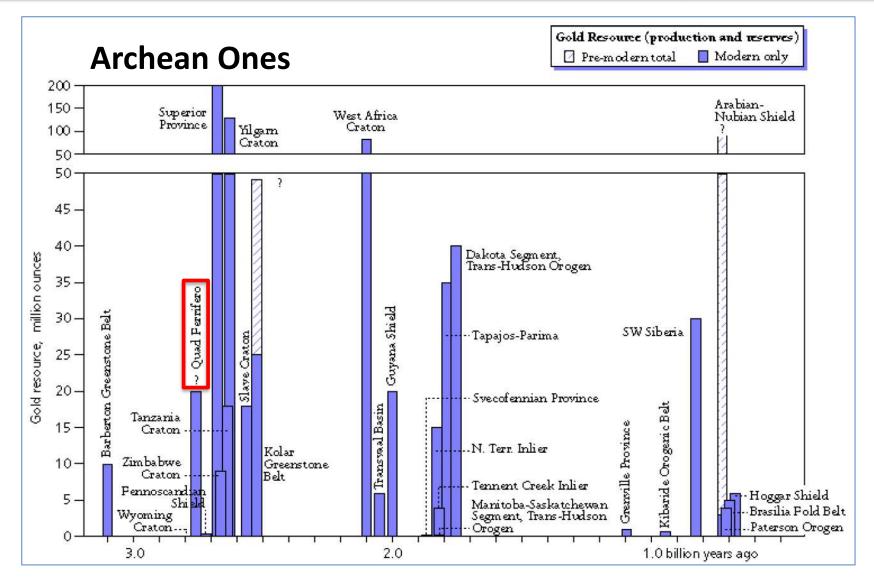
#### The Iron Quadrangle District - São Francisco Craton





#### Gold production: Orogenic gold belts worldwide

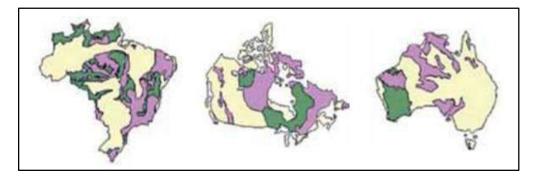
MINING INC.



Temporal distribution of orogenic gold deposits using best approximations of gold production and age for individual gold provinces: adapted from Goldfarb *et al* 2005.

## **Investments in Exploration in 2013**

(Precious Metals + Base Metals + Diamonds; Iron not included) 2013 Seen as Perhaps the Last "Golden Year" for Gold Exploration Worldwide

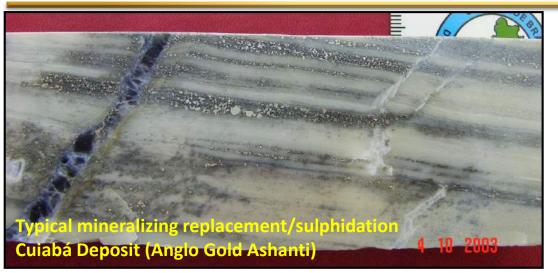


	Brazil	Canada	Australia
Continental Area - 10 <sup>6</sup> km <sup>2</sup>	8.5	9.9	7.7
1969-1990 Production - t Au/km <sup>2</sup>	0.9	3.4	5.7
Investments in Exploration in 2013 (US\$)	645 millions	3,440 millions	2,580 millions
Investment per km <sup>2</sup> in 2013 (US\$)	76	287	226

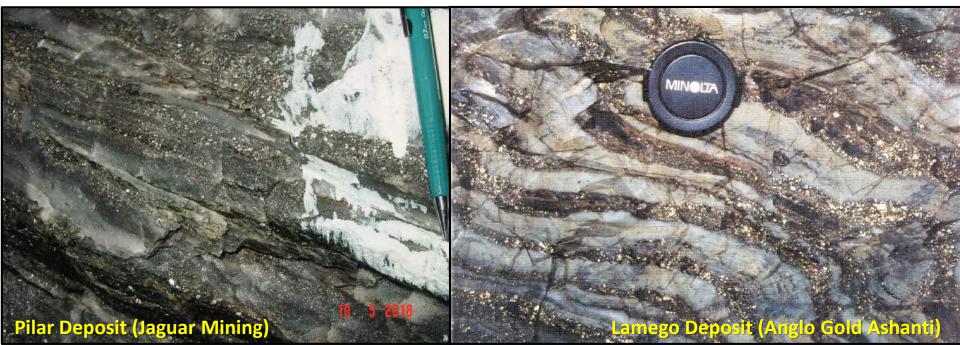
Source: ARANTES and MACKENZIE, 1995; SNL/MEG, 2013, modified



#### Rio das Velhas greenstone-belt and its "orogenic" gold deposits

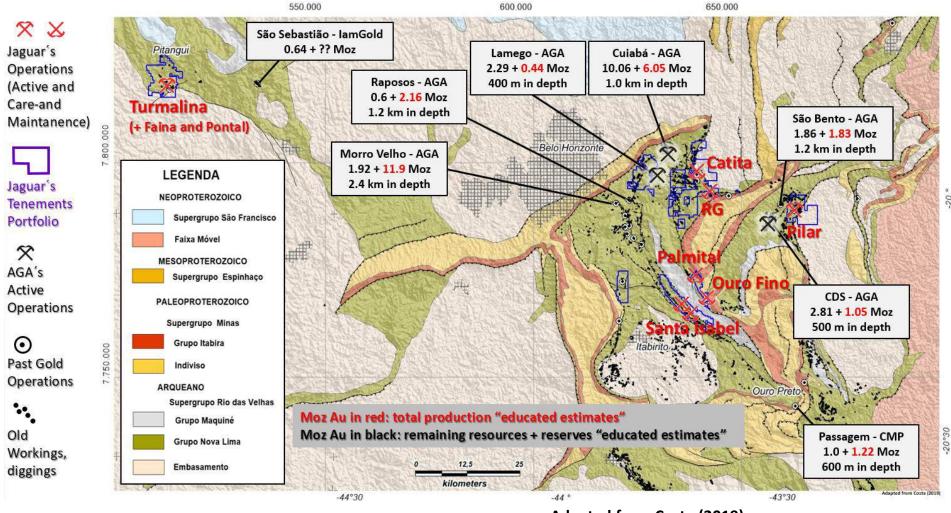


However, in the first place, a global type-locality for stratabound, replaced BIF-hosted gold deposits of Archean age





#### IQ District: Geological setting, main gold deposits and Jaguar's positioning



Adapted from Costa (2019)

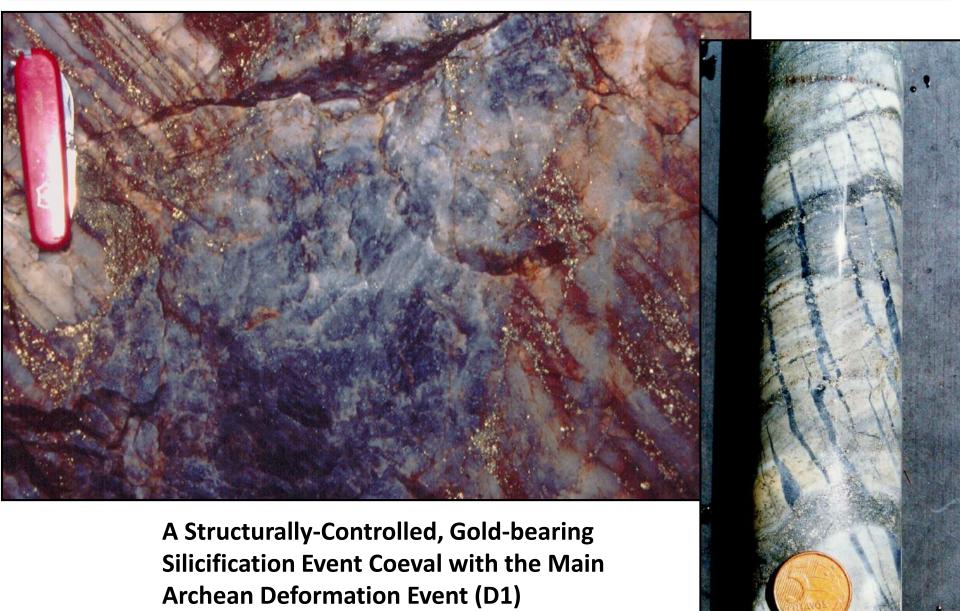


#### Rio das Velhas gold deposits: geological setting and some main facts

- Main host/fertile "Algoma-type" BIF Units: stratigraphically located at the end of major volcanic cycles of the greenstone-belt, and predating the deposition of upper sedimentary piles composed of graywackes and turbidites;
- The mineralization consists of stratabound, mainly "lateral" replacements/sulphidations of the iron carbonate-rich bands of the host "Algoma-type" BIF units. However, the BIF-hosted gold mineralization is definitely not stratiform-syngenetic in nature;
- A temporal-spatial-genetic relationship between the replacement/sulphidation of the BIFs and a structurally-controlled silicification event;
- Economic strike-lengths of only 50 to 350 m for individual economic zones. Average thicknesses from 4 to 20 m;
- Increased gold grades and higher sulphide concentrations in association with fold hinge zones of reclined folds;
- Down-plunge continuities: orebodies plunge with the orientation of an intersection lineation (between bedding and tectonic cleavage) that mimics the orientation of axes of major reclined folds;
- Major orebodies and underground operations showing fantastic and reliable multi-km continuities down-plunge: all major orebodies widely open at the bottom of their resources bases;
- Deposits amenable to both bulk mining and more selective high-grade underground operations.



#### Rio das Velhas gold deposits: geological setting and some main facts





#### Rio das Velhas gold deposits: geological setting and some main facts

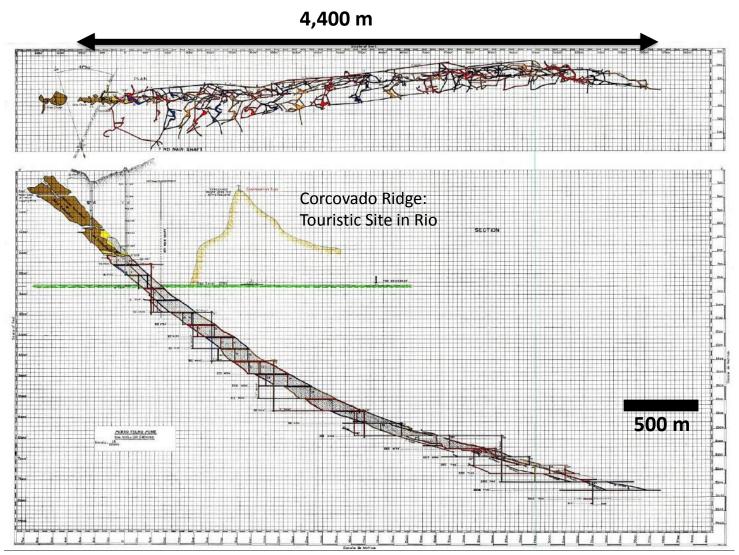


A Structurally-Controlled, Goldbearing Silicification Event Coeval with the Main Archean Deformation Event (D1)



Example of the gold-bearing silicification as a penetrative axis plane cleavage of Archean age

#### Down plunge continuity: all orezones open at great depths

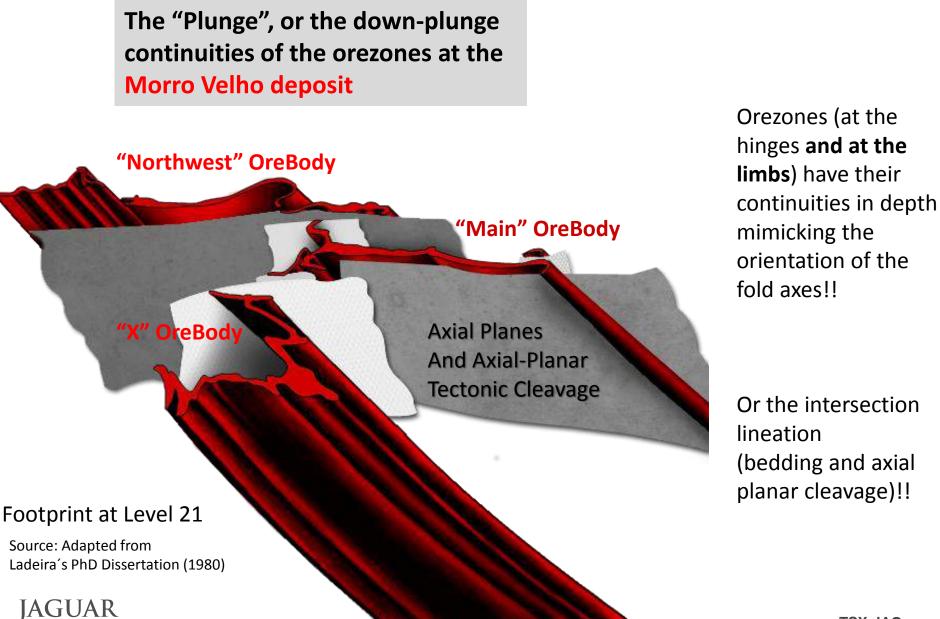


Longitudinal schematic section -The **Morro Velho Gold Mine**; showing shafts, drifts, the 29 operational levels, and the flattening of the plunge of the orebodies with depth

HOLLOWOOD, B., 1955. The Story of Morro Velho (The Saint John d'El Rey Mining Company Limited). London, Private Circulation, Samson Clark & Co Ltd., 88 p.



Reclined/Plunging Folded Packages: Down-plunge Continuity of Stratabound Orezones



MINING INC.

Until it closed in 2002, the largest and deepest gold mine in North America

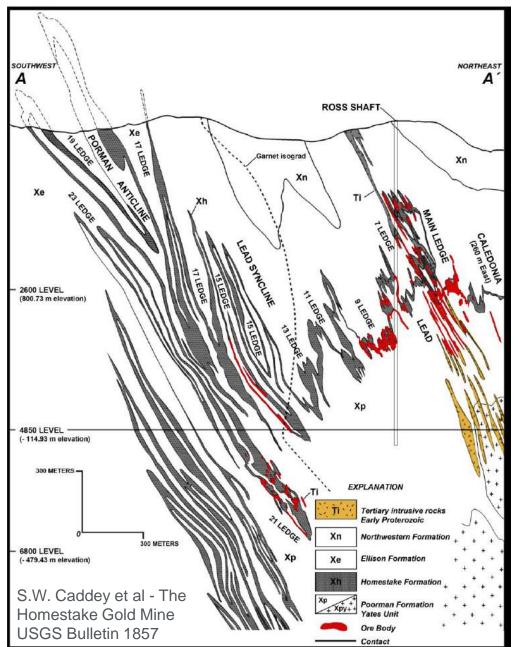
## 43,900,000 Oz produced

Gold confined to the Homestake Formation, an Early Proterozoic layer with iron carbonates and iron silicates.

The Homestake Formation has been deformed into synclines and anticlines. Ore mineralization occurred mainly in the synclines, called Ledges.

Source: Caddey et al. (1991)

JAGUAR



"The Kibali deposits are hosted within the Neo-Archean Kibali Greenstone Belt"

"gold deposits are largely hosted in siliciclastic rocks, banded iron formations, and cherts". "associated with halos of quartz, ankerite, and sericite alteration that extend for 10s to 100s of metres into the adjacent rocks." "The gold bearing sulphides consist of disseminated pyrite, minor pyrrhotite, and arsenopyrite."

"Gold is concentrated in gently NE to NNEplunging shoots whose orientations are generally parallel with a prominent lineation in the mineralised rocks.

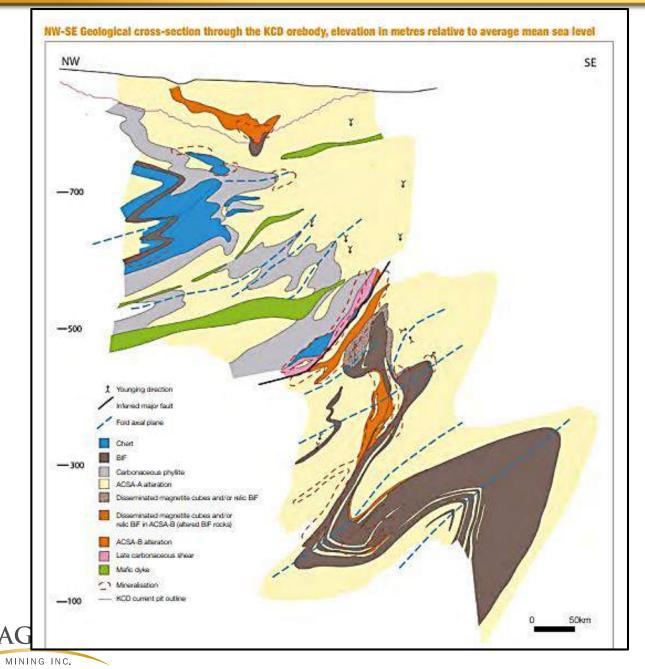
"The prominent gently NE-plunging lineation widely developed throughout the KZ Structure and whose origin has been the subject of much discussion is parallel to the axes of both the F2/14 and F3/14 folds."

"The lineation marks the intersection of F2/14 and F3/14 axial planes with earlier fabrics such as the S2/14 and S1/14 foliations and lithologic layering. It is therefore not parallel with the tectonic transport direction during either phase of deformation."

Technical Report on the Kibali Gold Mine, Democratic Republic of the Congo Report for NI 43-101 Randgold Resources Limited (2018)



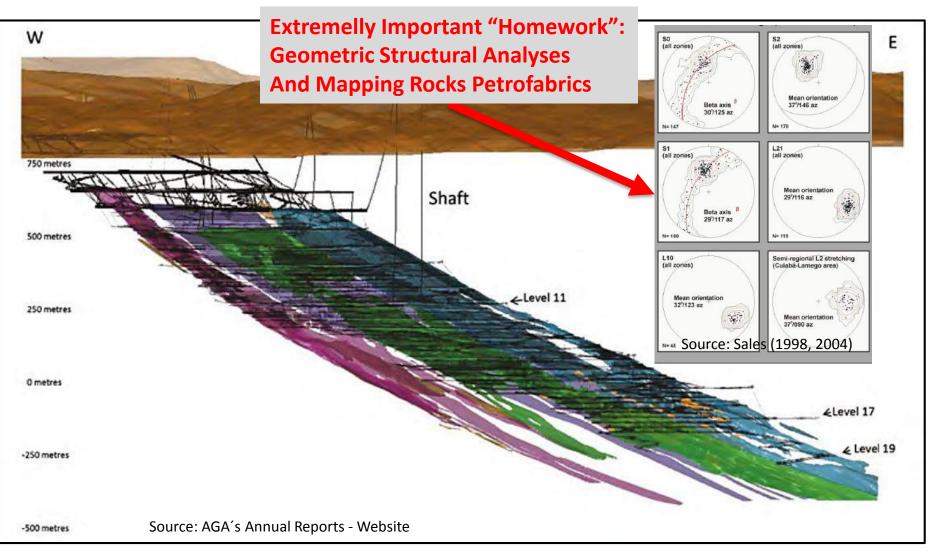
## Immediate analogies: Kibali Project in the DRC



Technical Report on the Kibali Gold Mine, Democratic Republic of the Congo Report for NI 43-101 Randgold Resources Limited (2018)

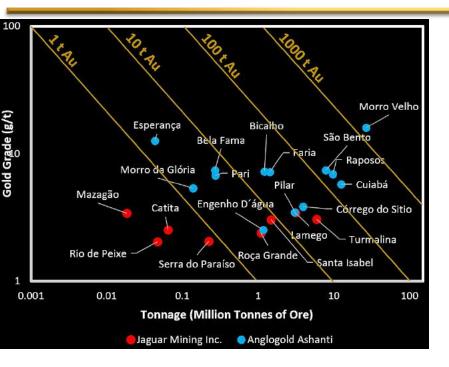
Kibali (RDC): 13 Moz (measured and indicated resources)

#### Longitudinal schematic section - The Cuiabá Gold Mine

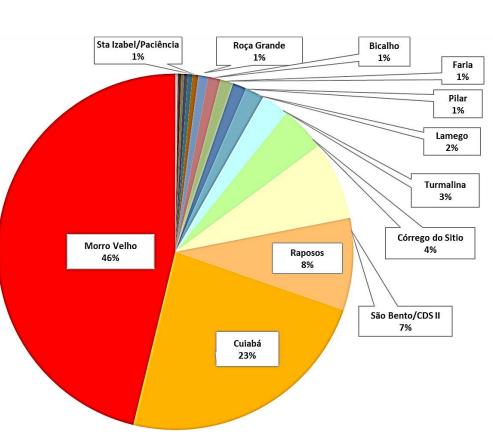




#### AngloGold Ashanti and Jaguar: The two gold players in the IQ district



Name	Moz	%	Name	Moz	%
Rio de Peixe	0.003	0.012	Lamego	0.441	1.714
Catita	0.004	0.014	Turmalina	0.652	2.532
Serra do Paraíso	0.006	0.023	Córrego do Sitio	1.053	4.090
Pontal	0.008	0.030	São Bento/CDS II	1.827	7.095
Esperança	0.018	0.068	Raposos	2.155	8.369
Mazagão	0.019	0.075	Cuiabá	6.046	23.477
Morro da Glória	0.023	0.092	Morro Velho	11.900	46.210
Pari	0.059	0.228	Cata Preta	0.003	0.124
Bela Fama	0.064	0.250	Ouro Fino	0.011	0.465
Lamego-Zona A e B	0.087	0.336	Palmital	0.020	0.822
Engenho D´água	0.110	0.427	Água Quente	0.020	0.834
Santa Isabel	0.136	0.527	Maquiné Del Rey	0.170	7.079
Roça Grande	0.231	0.895	Itabira	0.253	10.545
Bicalho	0.287	1.114	Cata Branca	0.269	11.204
Faria	0.307	1.190	Gongo Soco	0.426	17.785
Pilar	0.319	1.238	Passagem de Mariana	1.226	51.141

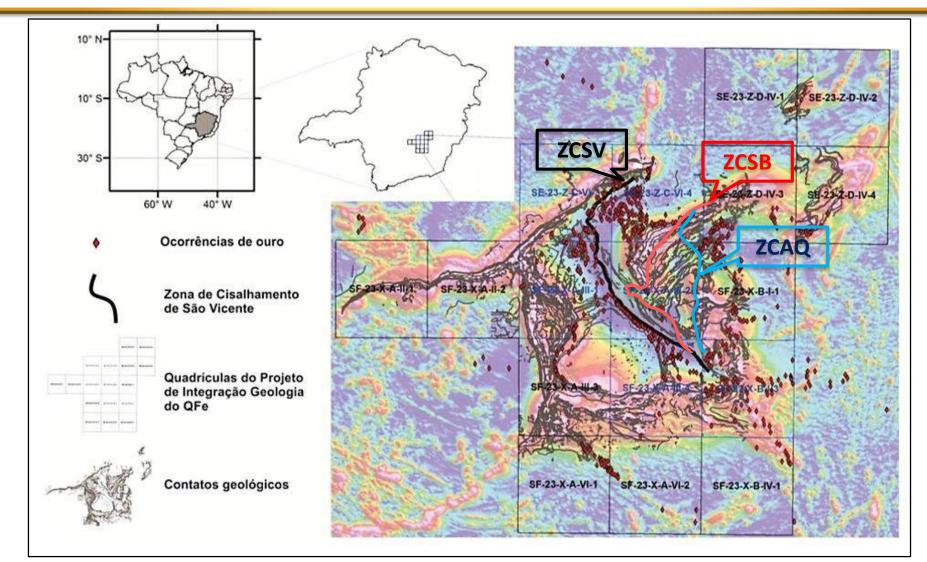


### Combined Past Production And Current Resources/Reserves

Educated Estimates!!

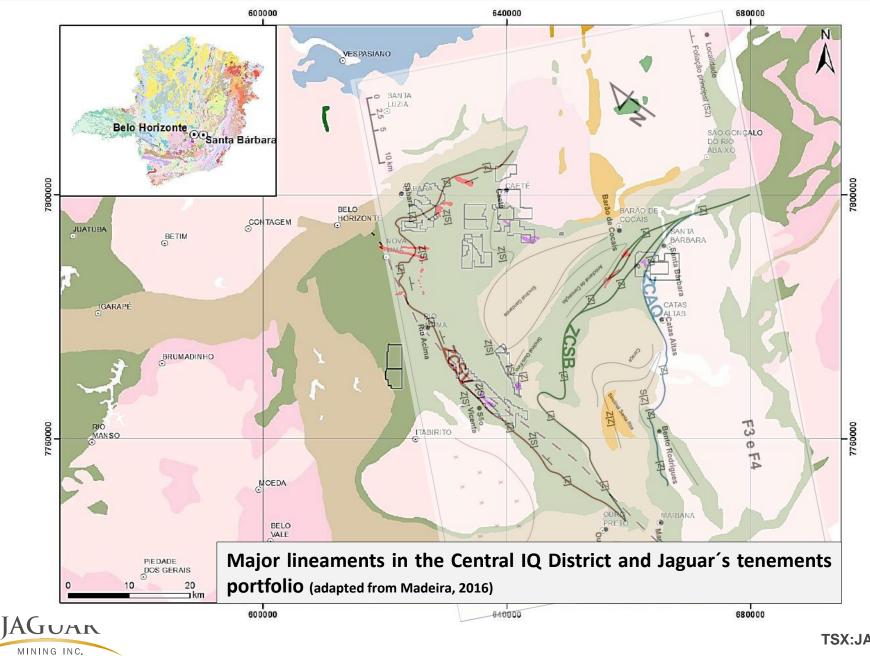
MINING INC.

#### Major prospective Archean lineaments: Tectonics? Stratigraphy? Both?



General map of the Iron Quadrangle structural framework; showing geophysics (analytical amplitude signal) general stratigraphy and the distribution of the gold deposits, old workings and showings. The São Vicente (ZCSV), Santa Bárbara (ZCSB) and Agua Quente (ZCAQ) lineaments are shown in black, red and green, respectively (adapted from Madeira, 2016)

#### Major prospective Archean lineaments: Tectonics? Stratigraphy? Both?







Focus on the Pilar Mine Story – Evolving Geological Model Armando Massucatto

Geology & Exploration Manager

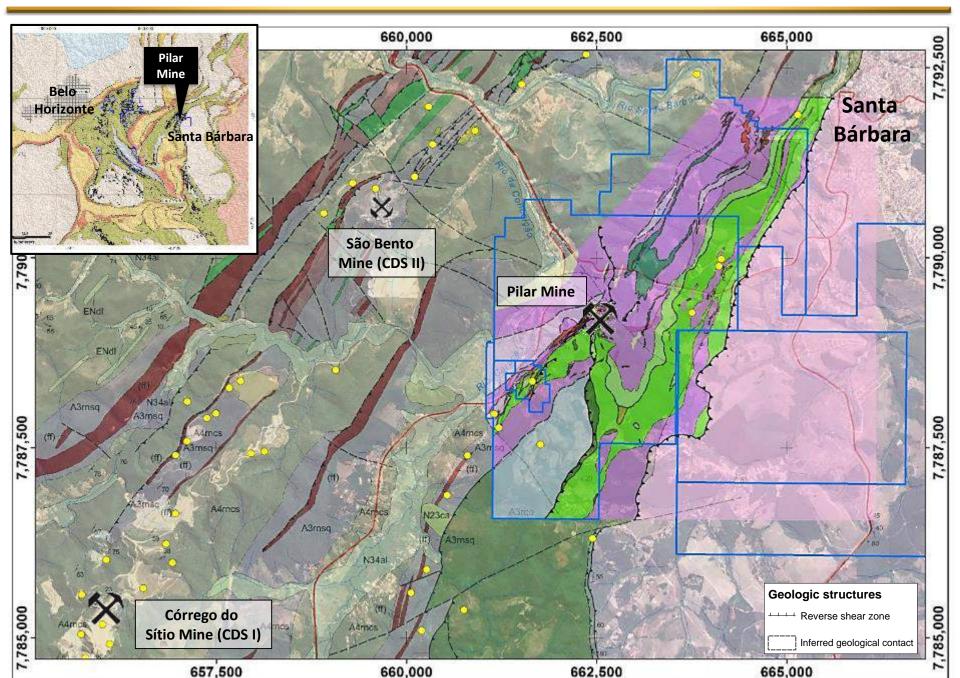


# PILAR MINE Geology evolution

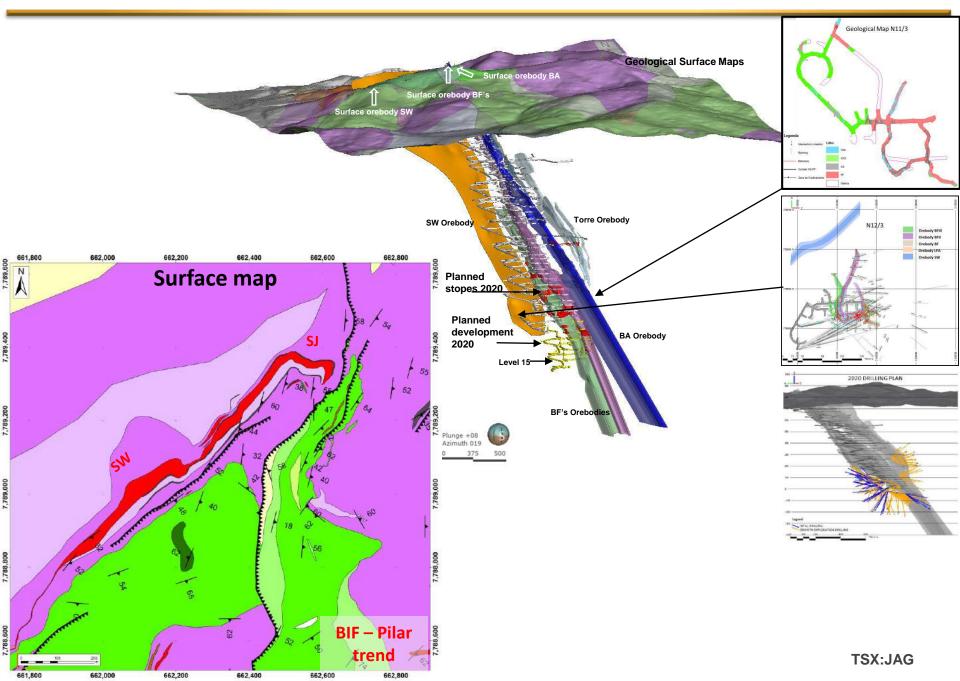
CM-93

MINA PILAR

#### Pilar region – Regional geological map



#### Pilar Mine – an overview



#### **Pilar Mine – "BIF facies" characteristics**





# Silicification Feeders of the BIF-hosted mineralization

#### **BIF OREBODIES**

- BF, BFII, BFIII, BA, LPA and SW
- **BIF Sequence** (layers of carbonate, quartz, silicates, and oxides).
- Carbonates (ankerite, dolomite, and siderite)
- Silicates layers comprise chlorite, sericite, and albite.
- Oxides layers comprise magnetyte, and hematite.
- **Sulphides** (arsenopyrite and pyrrotite), (massive sulfide or disseminated zones) in BIFs or disseminated around quartz veins.

#### **Pilar mine – ore characteristics**

#### DDH PPL451 – Torre orebody



#### **TORRE Mineralization**

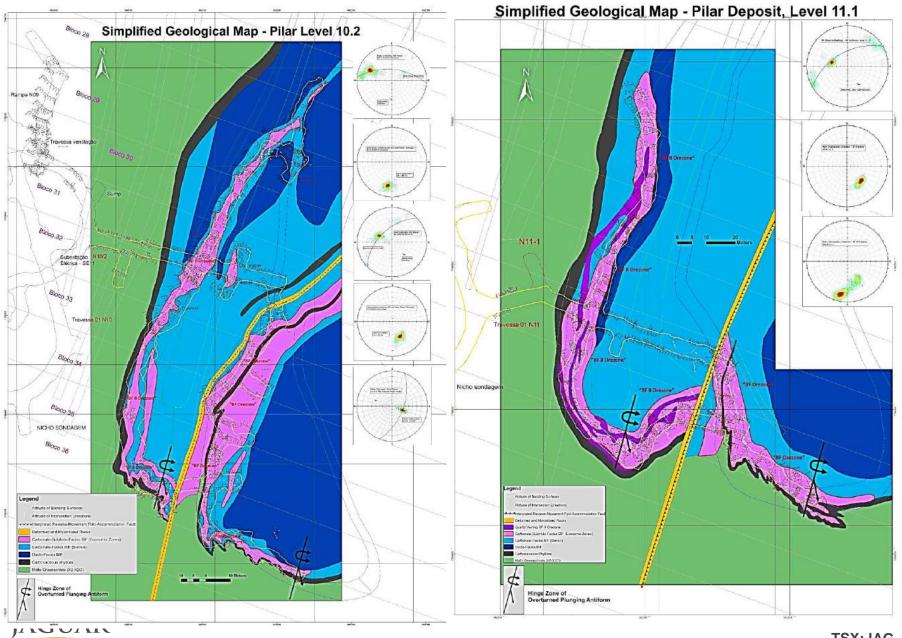
- Hydrothermally altered Metamafic Schists (quartz, chlorite, albite, carbonates, biotite and sericite)
- **Sulphides** arsenopyrite and pyrrotite that occur disseminated or with quartz veins.

# DDH PPL443 - VG in BF2 orebody<sup>26/01/2018</sup>





#### Pilar Mine – underground map



#### Pilar Mine – underground mapping





Sketch: broad btructure of the Pilar Mine geology; an example of fractal geometries in a geological setting



#### **Pilar Mine – underground mapping**





#### **Pilar Mine – polyphase and complex geometries and structures**

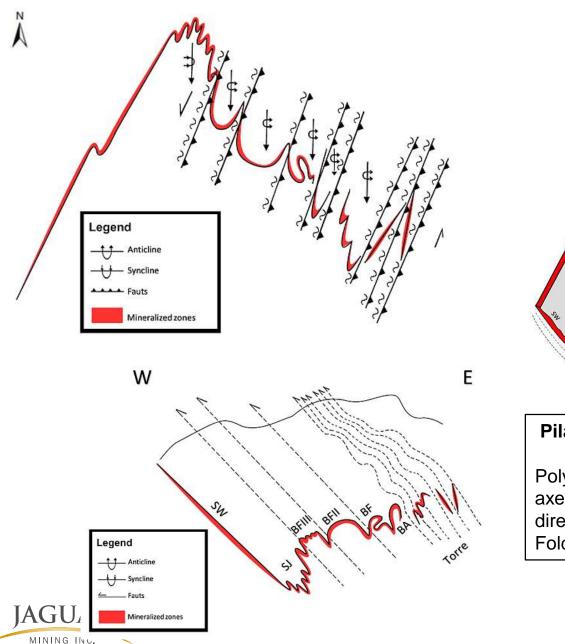


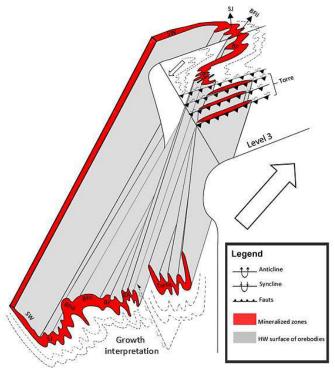


Folds in BIF packages of complex geometry - DDH PPL442



#### Pilar Mine – UG Exploration – Mine geometry

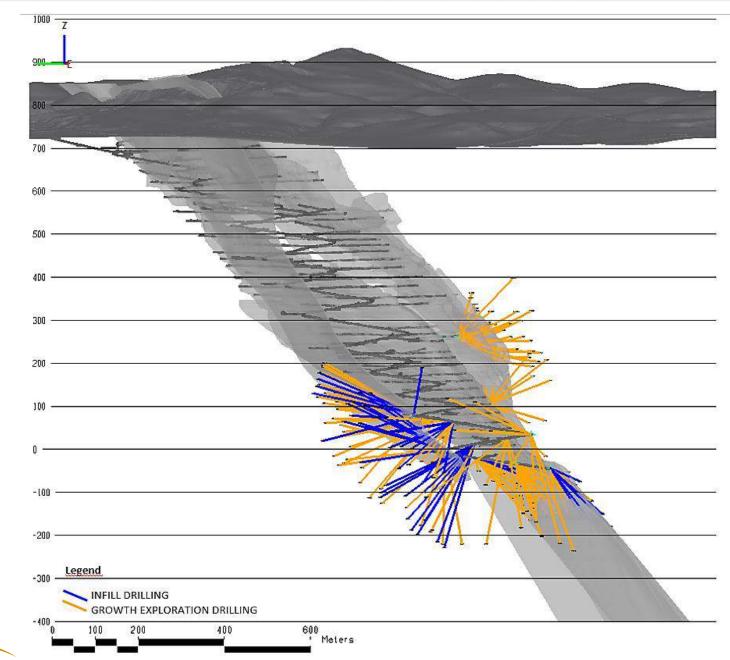




#### Pilar Mine structural framework -

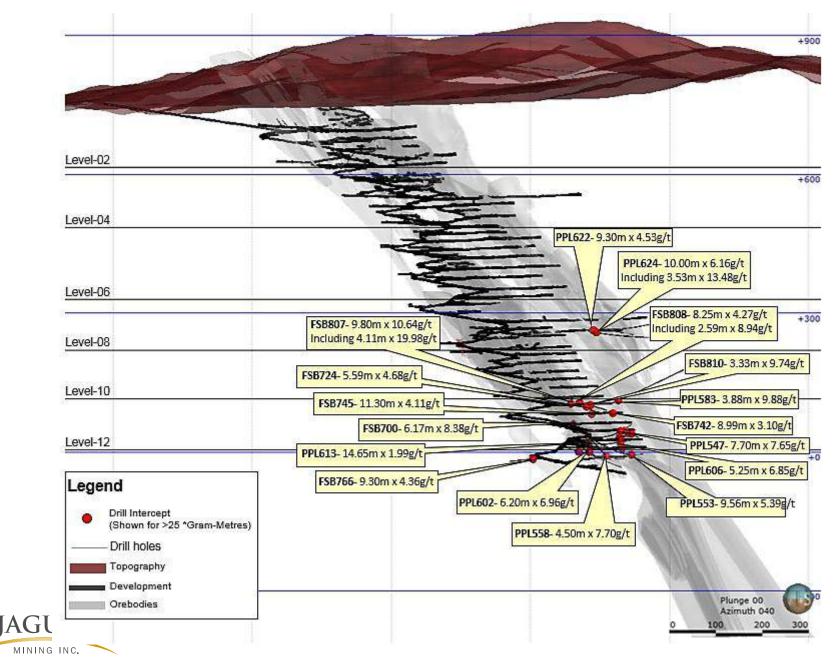
Polydeformed and refolded geometries: Fold axes plunging 45°-to-65° to the South direction (from 155 to 180 azimuth trends). Folded limbs opening at greater depths.

#### Pilar Mine – Underground Growth Exploration – 2019 / 2020 drilling



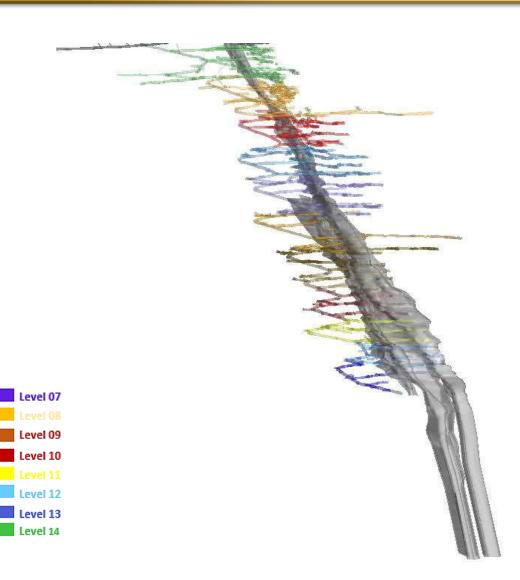


#### **Pilar Mine – Underground Exploration – Recent assay results**



(:JAG

#### Pilar new geological model – BF, BFII and BFIII orebodies video

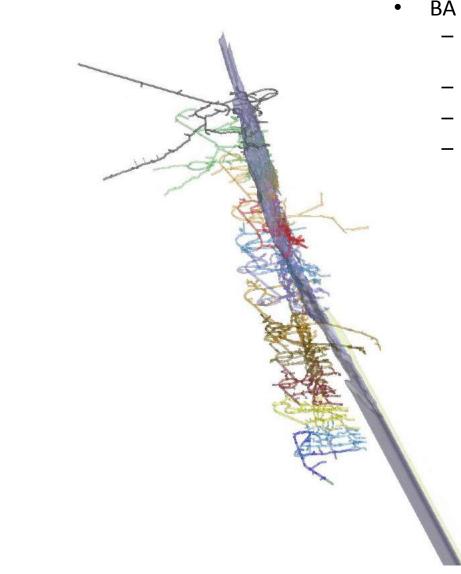


- BF, BFII and BFIII orebodies
  - Current model revised from Oct 2019 to Jan 2020
  - Database updated up to Oct 2019
  - From the sea-level elevation to the -399 elevation
  - Average plunge/trend continuities for the orebodies: 48/170 azimuth

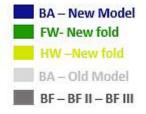




#### Pilar new geological model – BA orebody video



- BA orebody
  - Current model revised from Oct 2019 to Jan 2020
  - Database updated up to Oct 2019
  - From the elevation 399 to -399
  - Average plunge/trend continuities for the orebodies: 55/140





Level 07

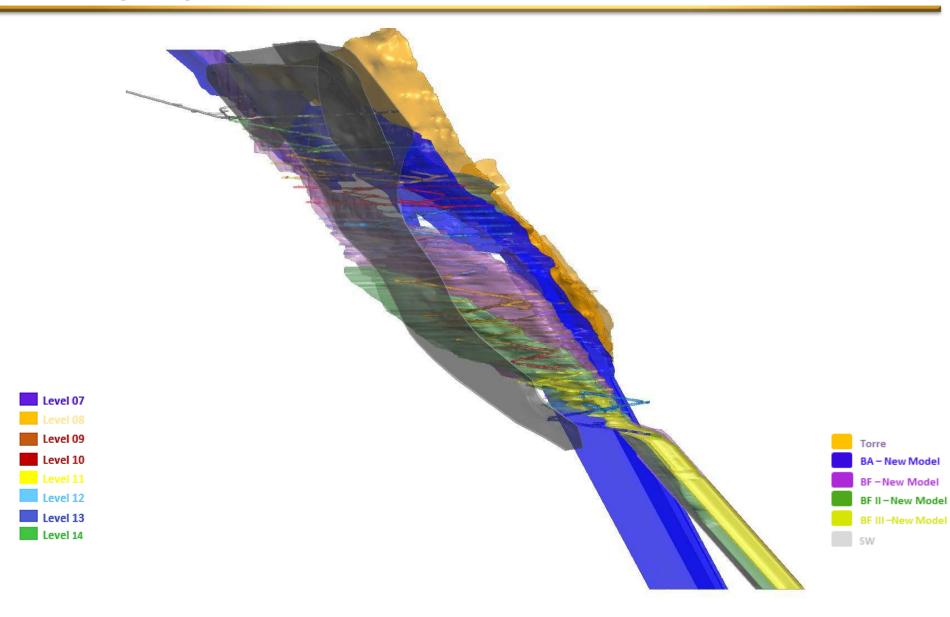
evel 09.

Level 10

evel 12

Level 13 Level 14

#### Pilar new geological model – all orebodies video



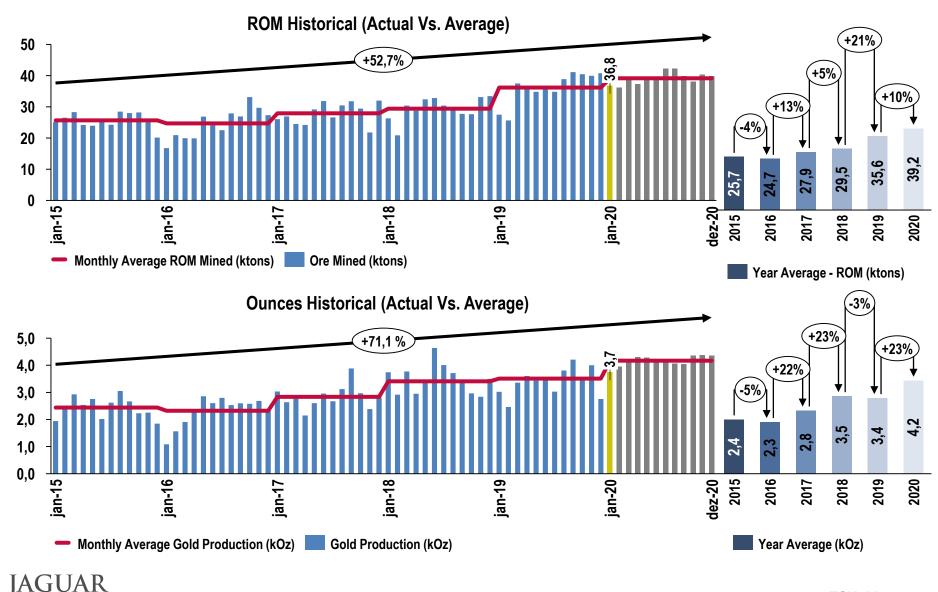


# **Pilar Mine opportunities** Short and Mid-term opportunities

2020.02.12

### **Production details**

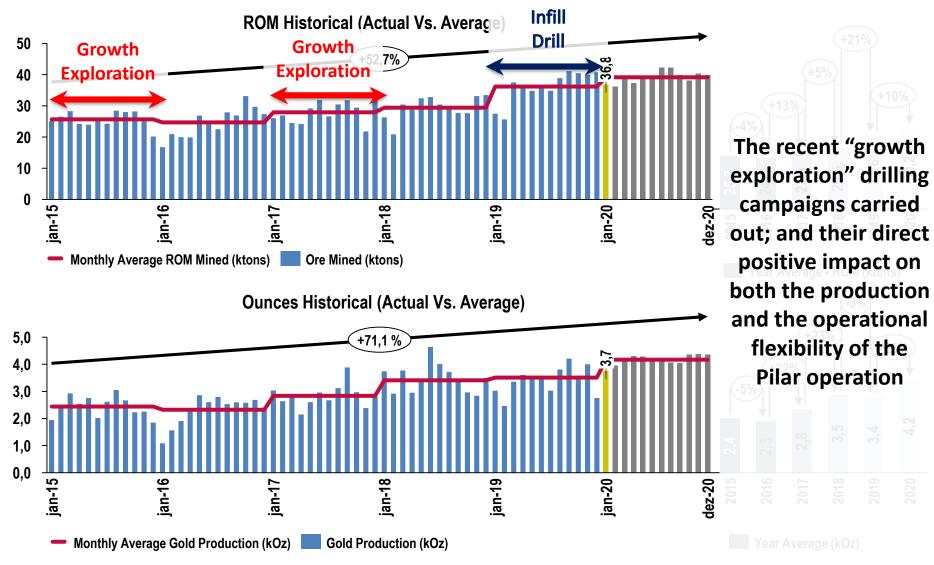
MINING INC.



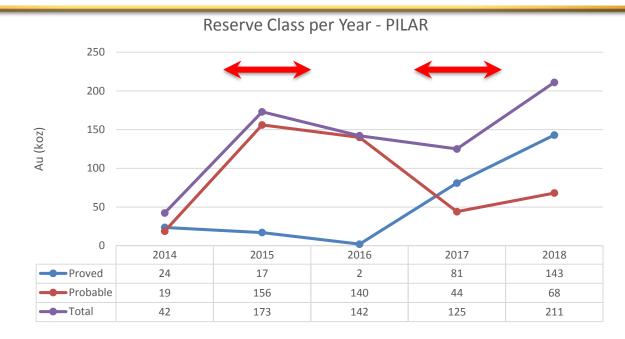
## **Production details**

JAGUAR

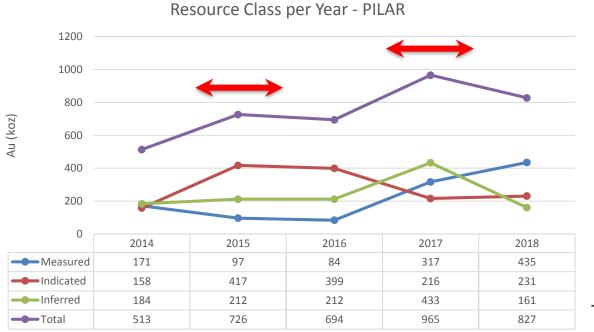
MINING INC.



#### **Pilar Mine – Positive impact of the drilling programs**



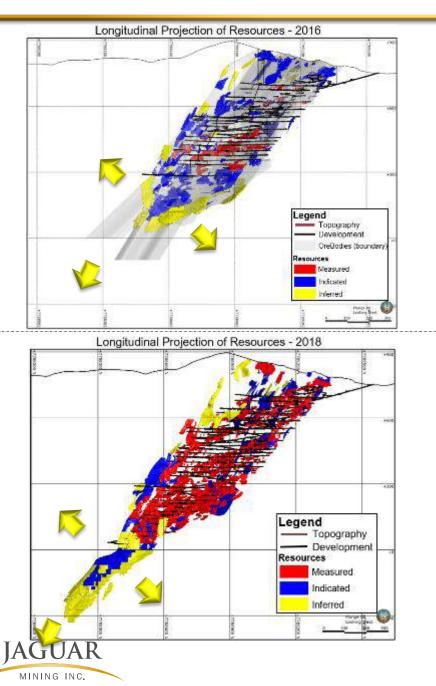
Growth Exploration Drilling

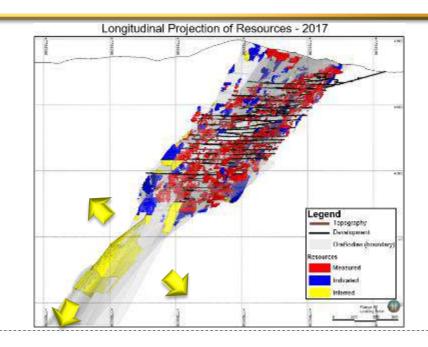


JAGUAR

**TSX:JAG** 

#### MRMR PILAR – Evolution from 2016 to 2018



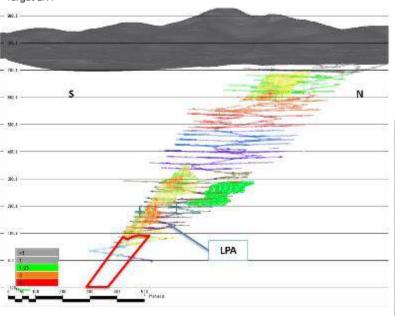


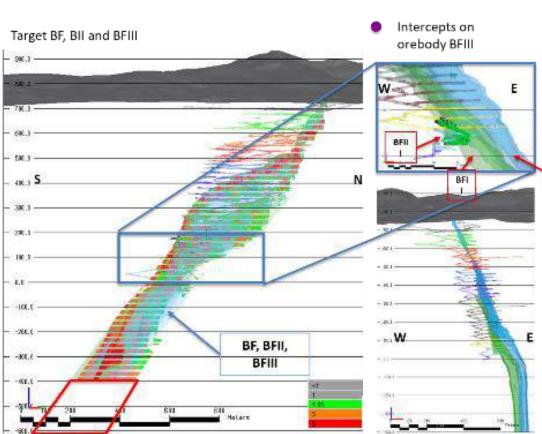
- ✓ Lateral Exploration to increase productivity (Oz/Vm).
- ✓ Plunge Extension Exploration to increase Life of Mine.



#### **Pilar – mid-term opportunities**

Target LPA

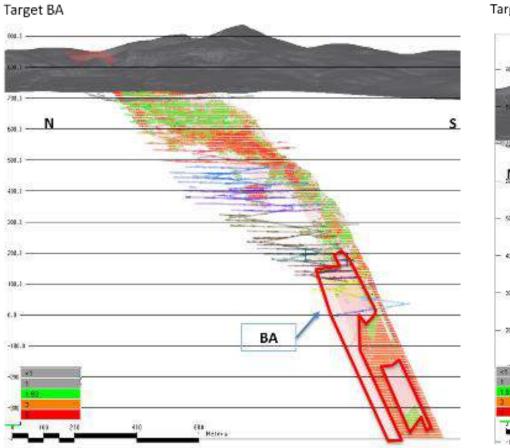




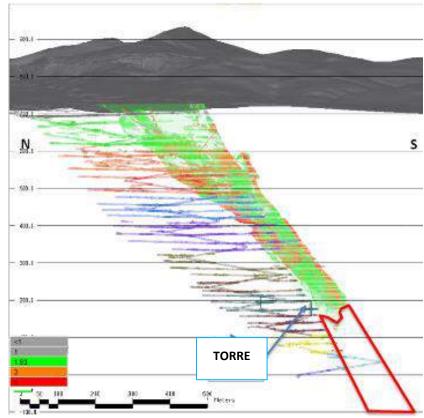


B F

#### **Pilar – mid-term opportunities**



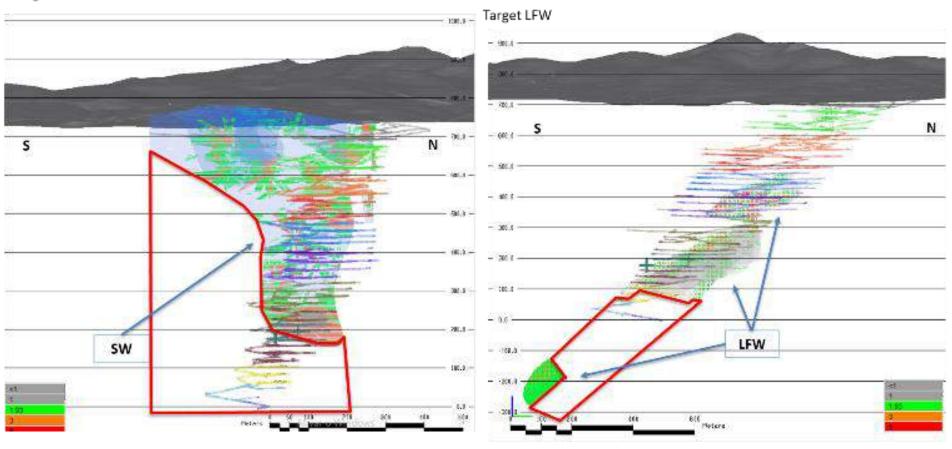
Target Torre





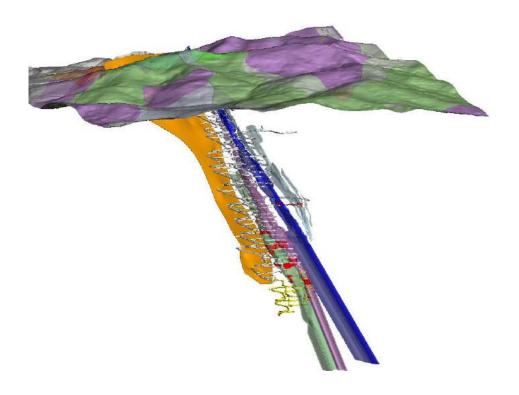
#### **Pilar – mid-term opportunities**

Target SW



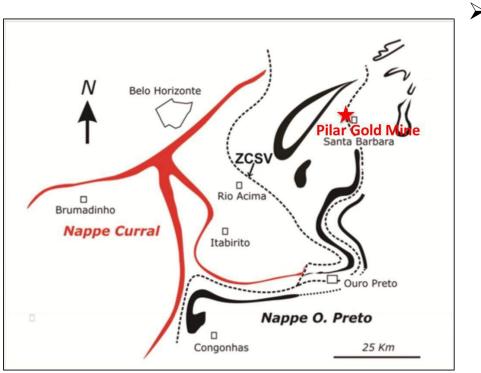


Pilar Mine – brownfields exploration Looking towards the future



- The vast majority of mined out ounces (1 km along plunge) and already identified down plunge mineral resources of the Pilar Gold Mine are hosted in a BLIND ore shoot;
- Let's understand the reasons of such a fact, to do so we must understand the structural context in which the Pilar Gold Mine in inserted.





Sketch map showing the relationship between the shear zones and the Ouro Preto *nappe*. The shear zones are associated to the detachment surface of the *nappe*. (adapted from Madeira, 2016)

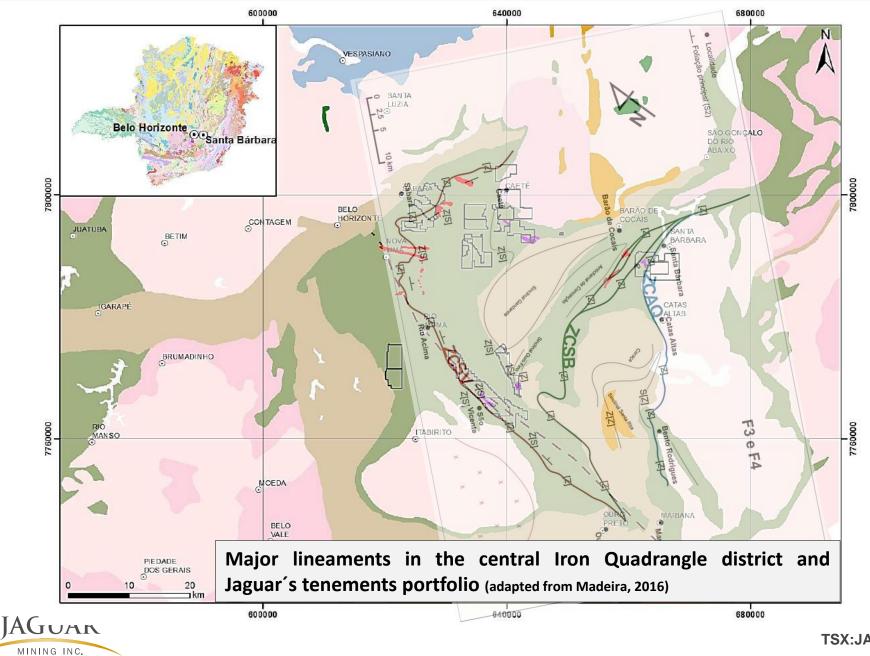
Two major structural elements are of paramount importance to the Pilar gold mineralization control:

> To be positioned at the geographic confluence of the Santa Bárbara and Água Quente Shear zones, both major regional structures associated with the detachment surface of the Ouro Preto nappe emplacement;

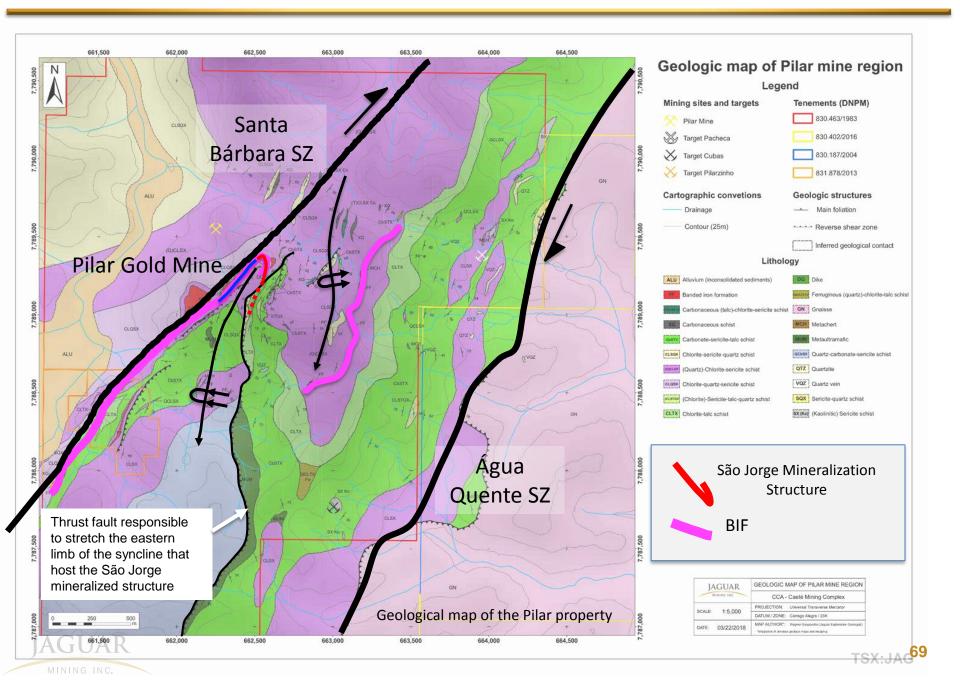
> The Iron Quadrangle gold mines distribution in space suggest those surfaces have played a major role as a plumbing system for gold rich hydrothermal solutions;



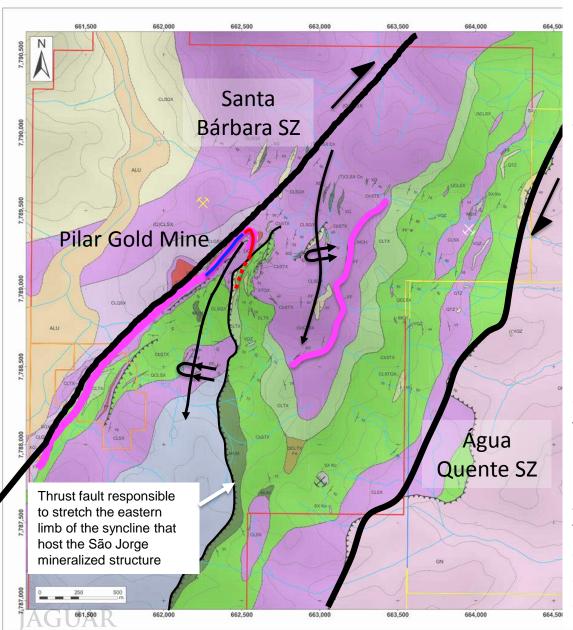
#### Major prospective Archean lineaments: Tectonics? Stratigraphy? Both?



#### **Pilar Brownfield Upside Potential**



#### **Pilar Brownfield Upside Potential**

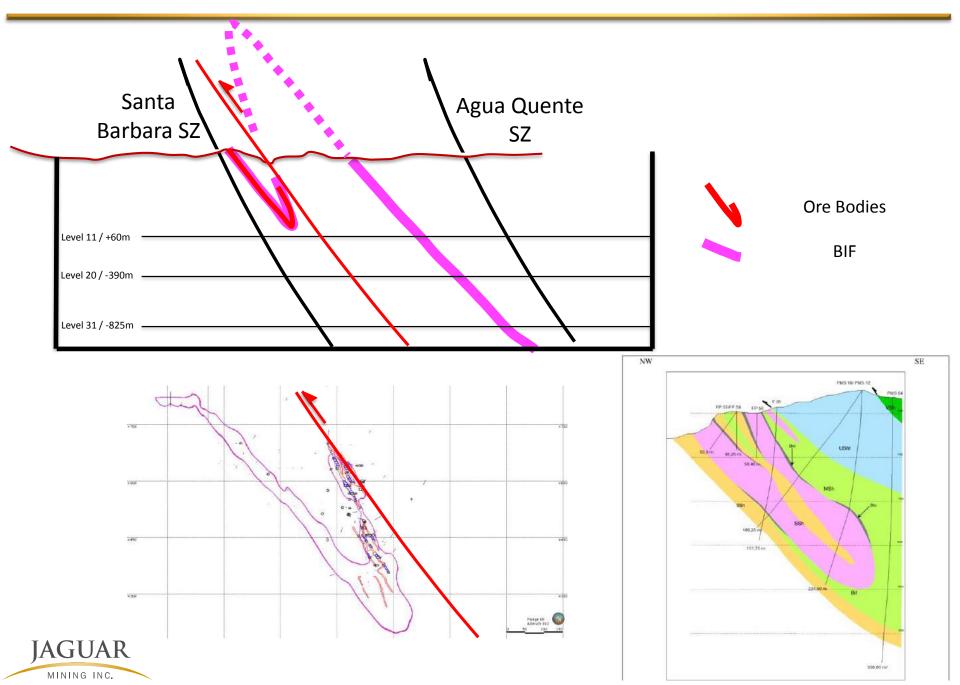


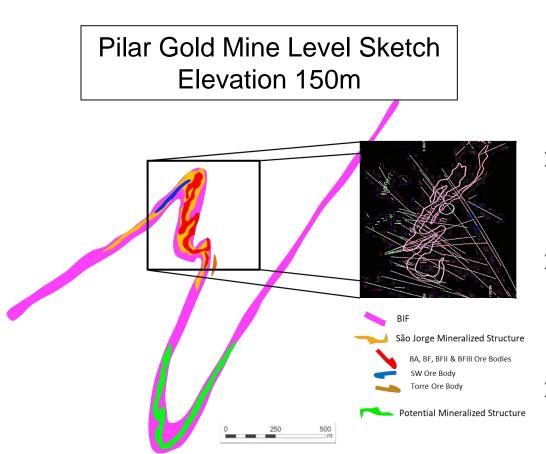
- Two major structural elements are of paramount importance to the Pilar gold mineralization control:
- The Pilar Gold Mine main ore bodies are hosted in Archean Banded Iron Formation. Host rocks were subject to intense compressional deformation with tangential thrusting from the East to the West resulting in SWvergent tight to isoclinal folds and NNW-Striking trust faults;

Underground mapping has clearly demonstrated the important role such folding has played in positioning the best gold lodes along the fold hinges.

Associated trust faults are responsible for locally stretching the SE limbs of the recumbent folds, resulting in the disrupture of the BA and BF orebodies near surface.

#### **Pilar Gold Illustrative Cross Section**





JAGUAR MINING INC.

- Short strike length (few hundred meters) and significative plunge continuity (ex.: 7,000 m plunge continuity of the Mina Grande Mine) are a well established feature of the gold mineralization in the Iron Quadrangle.
- Pilar falls into this category with already 1,000 meters mined out plunge continuity and another 300 meters identified by drilling;
- Geological mapping has revealed the lack of continuity at surface of a significant portion of the BIF that has been mined underground during the last 10 years;
- Structural U/G mapping integrated with diamond drilling and surface geological mapping have lead to the construction of a comprehensive 3D model that suggests the strong possibility of additional blind ore shoots, similar to the São Jorge structure.

#### PAST, present and future



Down plunge continuity of orebodies in the Iron Quadrangle is common to virtually all known occurrences in the region with Morro Velho and Cuiaba Mines the best examples.

Lithological and structural control are fundamental ingredients when considering target generation and exploration strategies.



#### Past, PRESENT and future



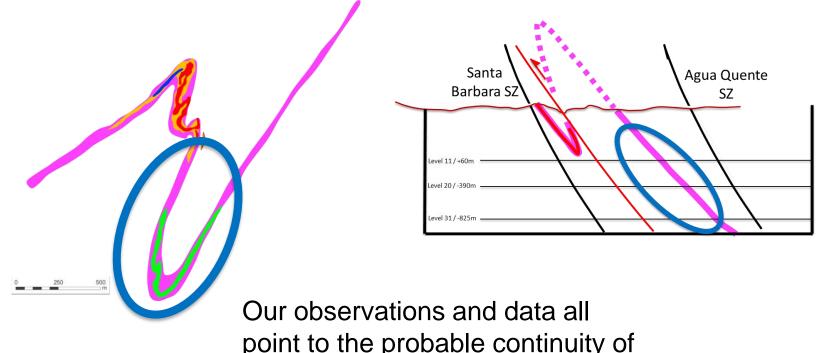
Pilar Mine shows the same strong lithological and structural controls as are seen within the major mines regionally.

Underground mapping shows the persistent continuity of the ore zones

Deeper Diamond Drilling continues to demonstrate this down-plunge continuity at consistent grades



#### Past, present and FUTURE



point to the probable continuity of the Pilar structure at depth and along strike.

This is the new search space to identify the next Pilar





#### **Qualified Persons**

Qualified Persons Scientific and technical information contained in this press release has been reviewed and approved by Jonathan Victor Hill, BSc (Hons) (Economic Geology - UCT), Senior Expert Advisor Geology and Exploration to the Jaguar Mining Management Committee, who is also an employee of Jaguar Mining Inc., and is a "qualified person" as defined by National Instrument 43-101 – Standards of Disclosure for Mineral Projects ("NI 43-101").

#### For further information please contact:

#### **Vernon Baker**

Chief Executive Officer Jaguar Mining Inc. vern.baker@jaguarmining.com 416-847-1854

#### Hashim Ahmed

Chief Financial Officer Jaguar Mining Inc. hashim.ahmed@jaguarmining.com 416-847-1854

