

Structural Evolution and Timing of Orogenic Gold Mineralization in the Klondike District, Yukon



Whitehorse YT, November 2019

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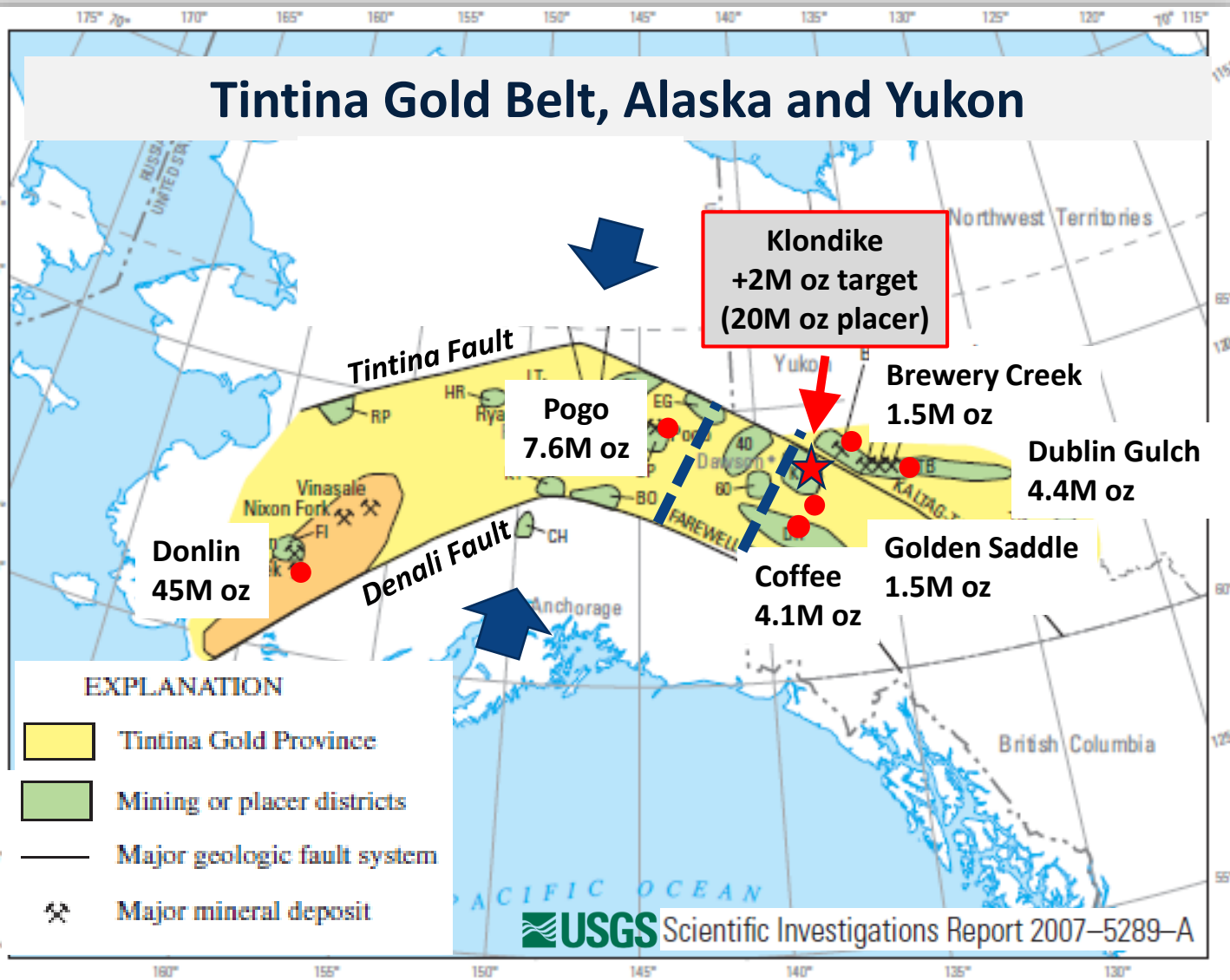
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KLONDIKE NEIGHBOURHOOD: WORLD CLASS



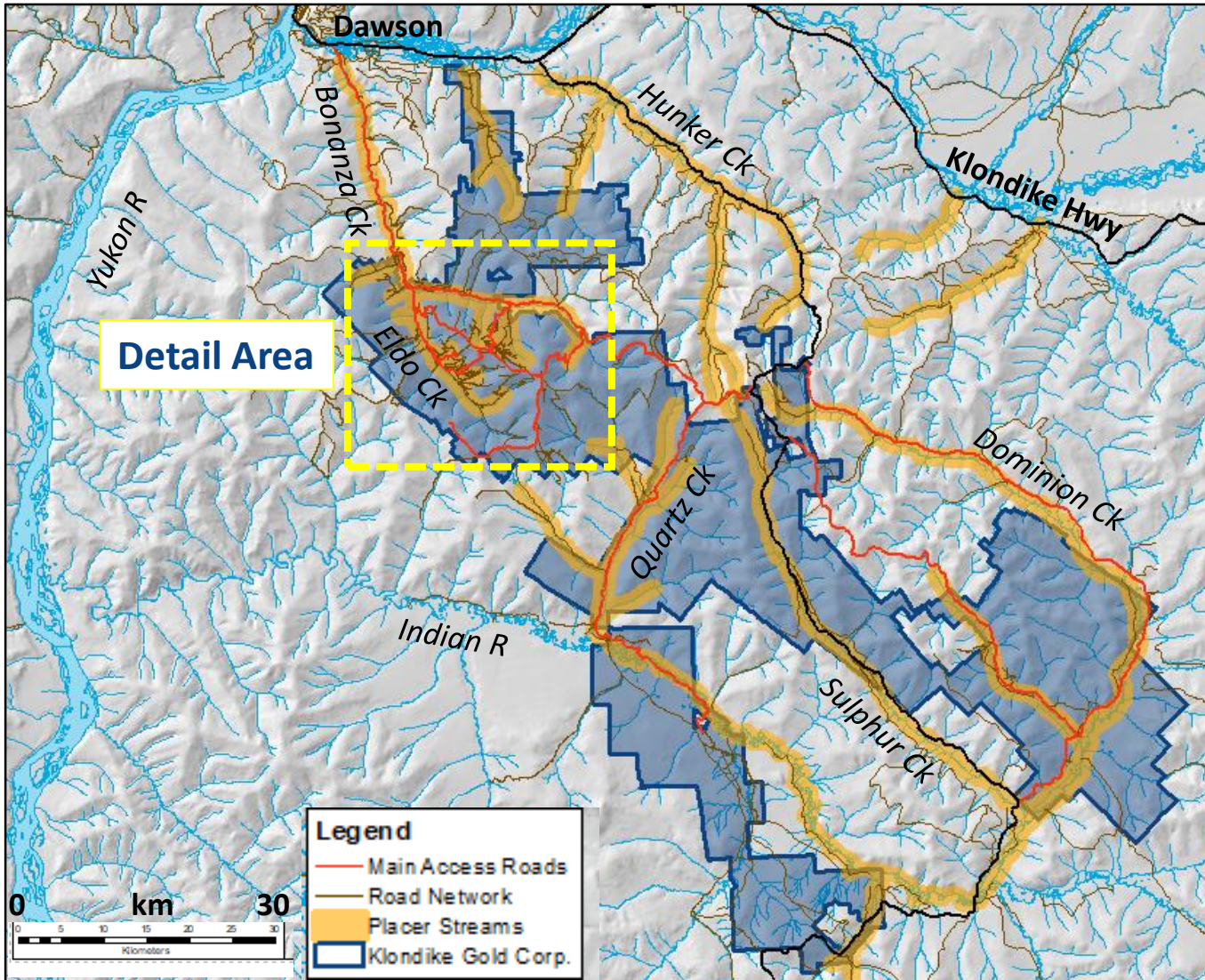
Tintina Gold Belt, Alaska and Yukon



- TGB is known to host “world-class” gold deposits.
- Flexure in crustal scale 1st order faults create “world-class” deposits by creating the fault network to host them.
- Cretaceous age ESE compression creates rotation and NE-SW dextral normal faults: **GOLD CONDUITS**.
- Nucleating Cretaceous intrusion-gold, and Cretaceous orogenic gold.
- Destor-Porcupine, Kalgoorlie etc.

Figure Note: Gold resource endowment is sourced from company disclosures or government sources, for comparative purposes only.

KLONDIKE PLACER DISTRICT



Klondike Placer District

- Placer gold mined 1896 to present
- ~20 M oz Au recovered
- World Class endowment

Klondike Claims ~600 sq km
Covers the Klondike Placer District

FIVE-YEAR SYSTEMATIC GEOSCIENCE



DISTRICT SCALE SURVEYS:

- Mapping / Soils / Magnetics / Radiometrics / VLF-EM / Structural Mapping / LIDAR / Orthophotography / Historical compilation

LOCAL SCALE SURVEYS:

- Diamond drilling 33,500m / Trenching/Channel sampling / Whole Rock / GT-Probe

SYSTEMATIC PROCEDURES:

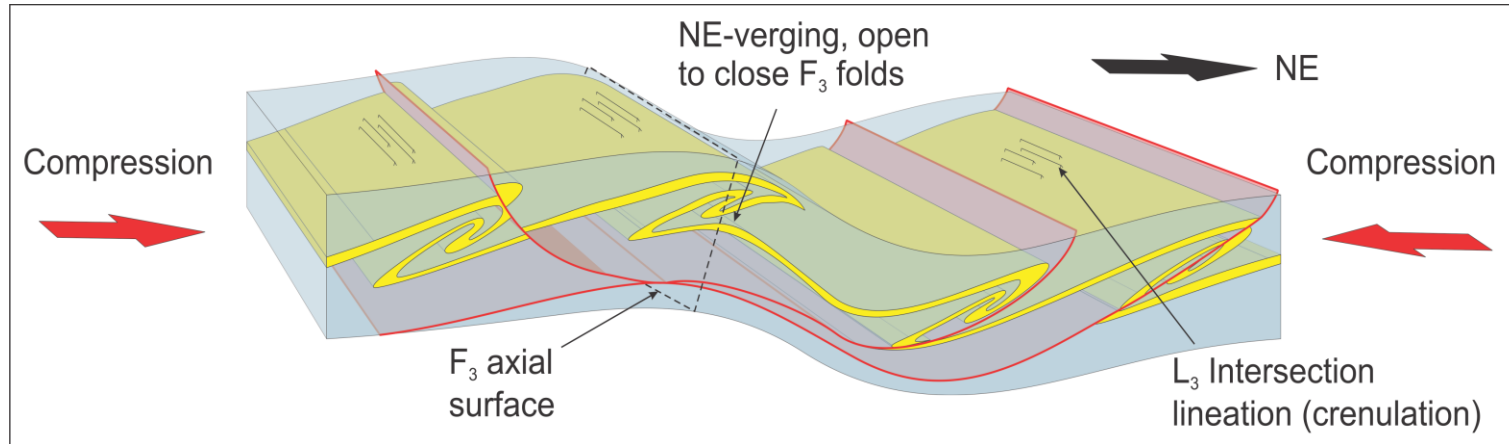
- Metallic screen assay, ultra-trace analyses, digital field (QGIS) and digital core (MXDeposit) logging, oriented core drilling

WARNING



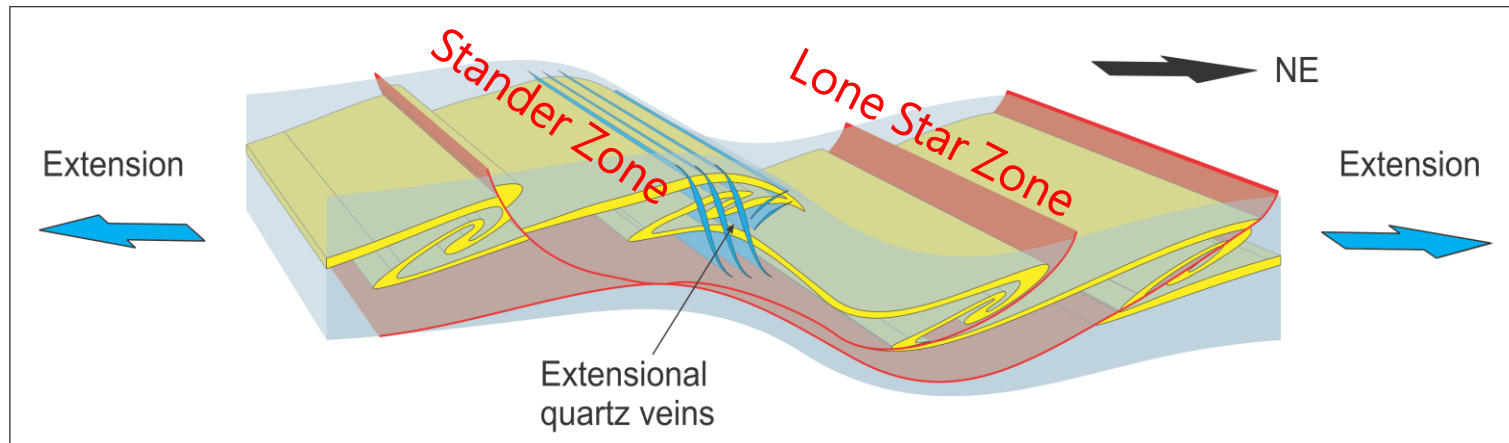
- **Tectonic setting and structural evolution (250 Ma to present):
ONLY THE GOOD BITS**
- **Mapping evidence for structure and lithology**
- **Gold mineralization**

D1 TO D3: COMPRESSION 250 Ma to 160 Ma



- Continuing NE directed compression.

Refolding. Open to closed recumbent folds.



D3 quartz vein arrays:
"Stander Zone" 5+ km long

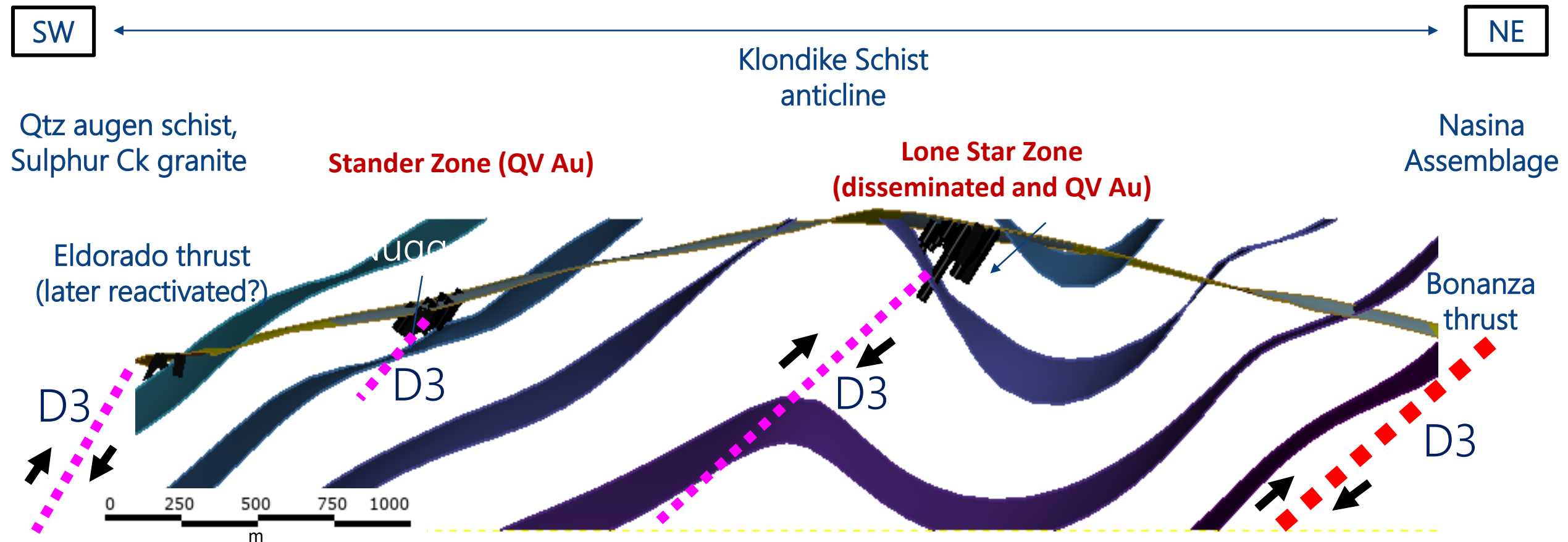
Debatable: "orogenic relaxation"
vs "sigma3 extension" veins

- Peak greenschist metamorphism.
- Sericite chlorite quartz schists.

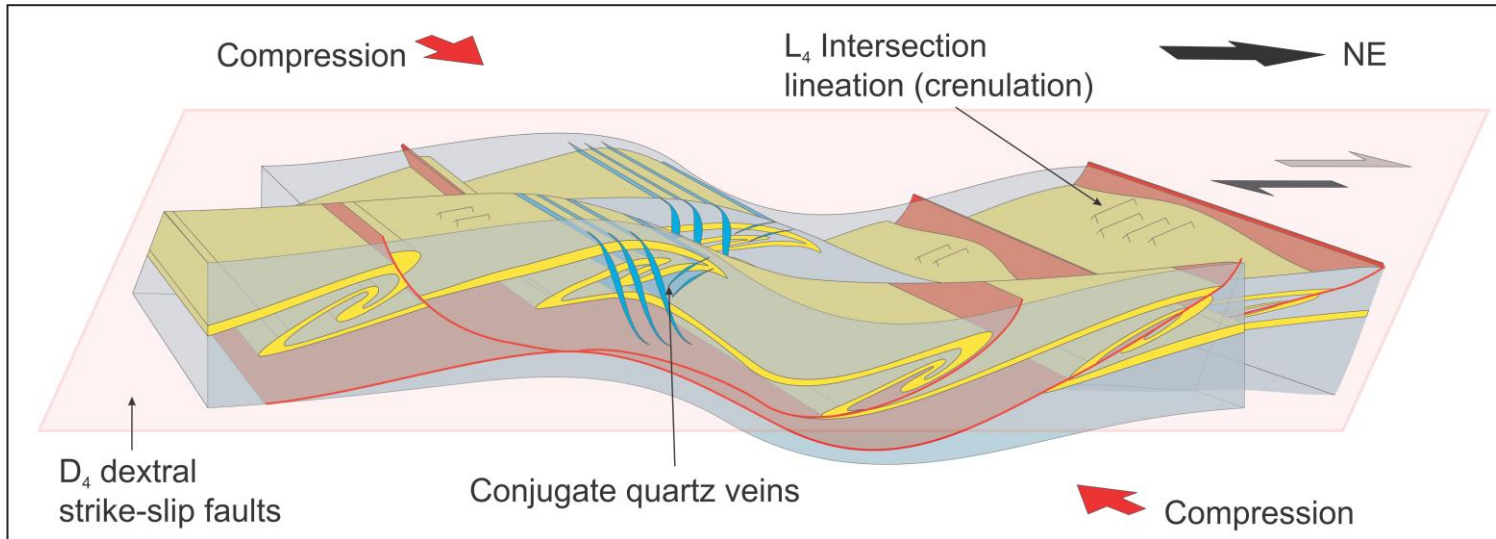
D3: End of Jurassic c. 145 Ma – ANTICLINE



SW to NE Pseudo Cross Section (Leapfrog S3 Foliation Model)



D4: Mid-Cretaceous (?) c.100* Ma



- 70 degree clockwise rotation in compression direction to ESE.
- D4 ENE-WSW normal (oblique, dextral) faults
- Reactivation of D3 into D4 dextral strike-slip faults
- D4 INTRODUCTION OF GOLD
- Gold occurs in reactivated D3 AND D4 faults

D5: Eocene dykes c. 55 Ma

- Continued rotation 70 degree clockwise) to N-S compression (E-W extension)
- N-S normal faults filled with bimodal dykes.
- Lamprophyre dykes at this time or earlier (?)

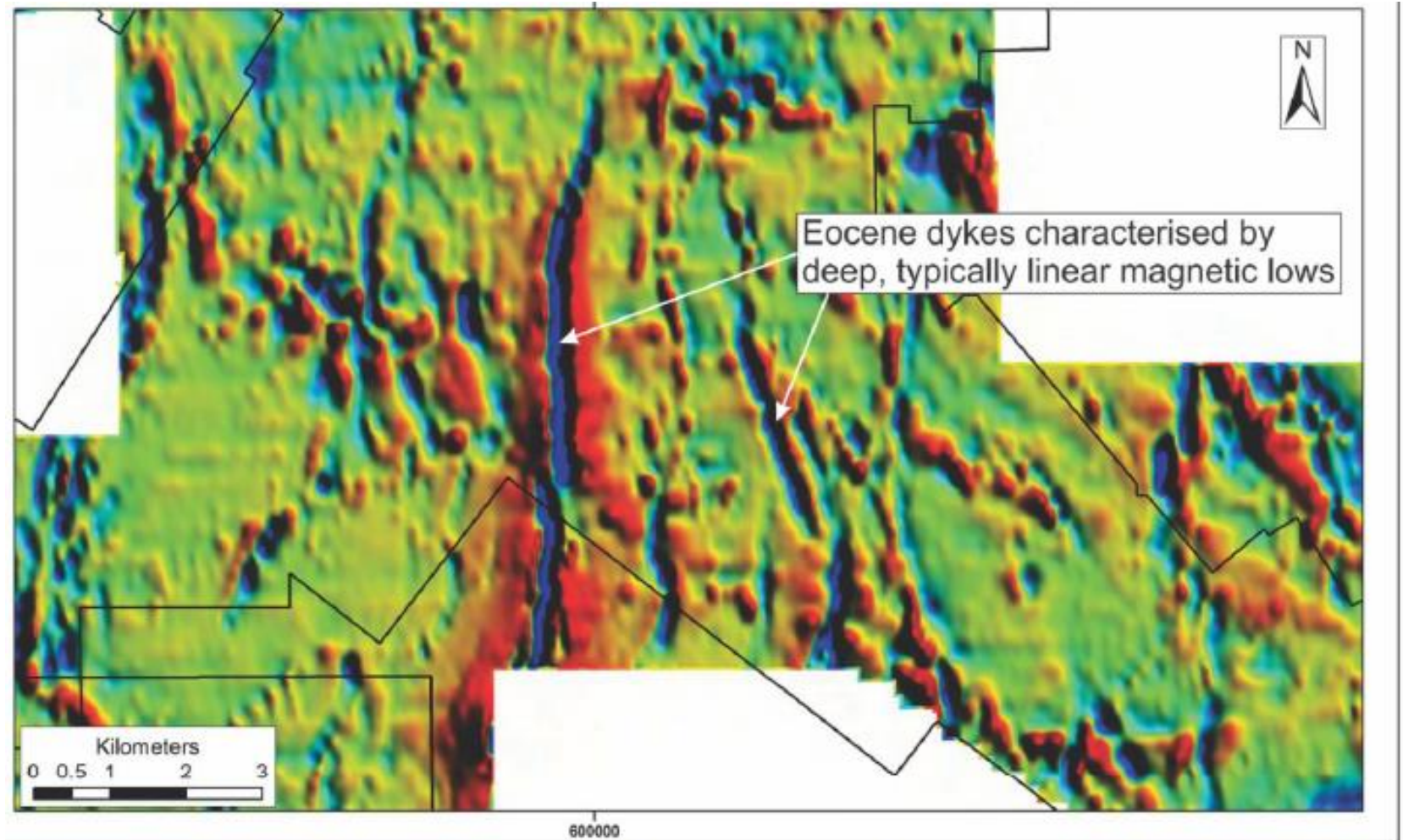
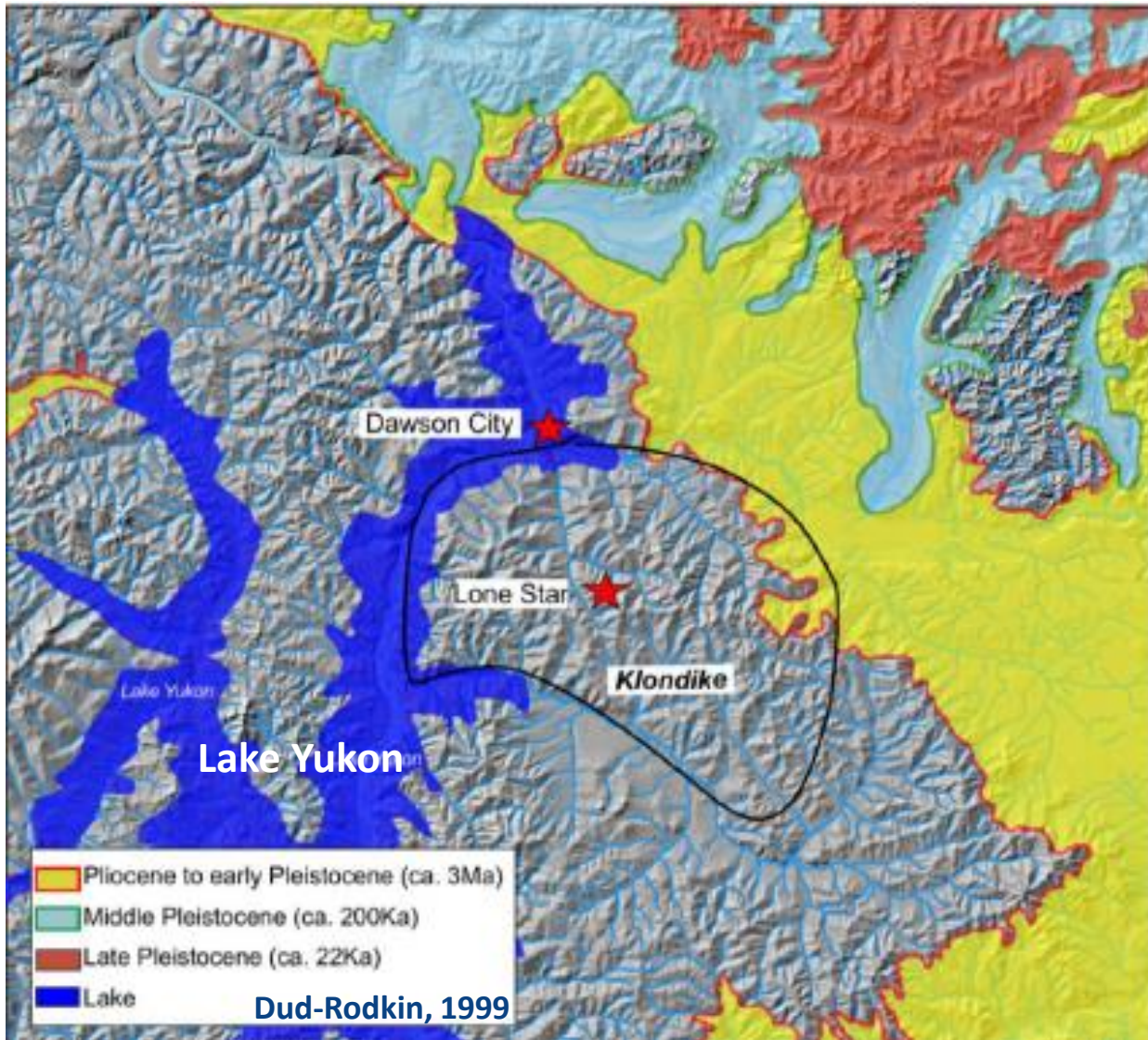


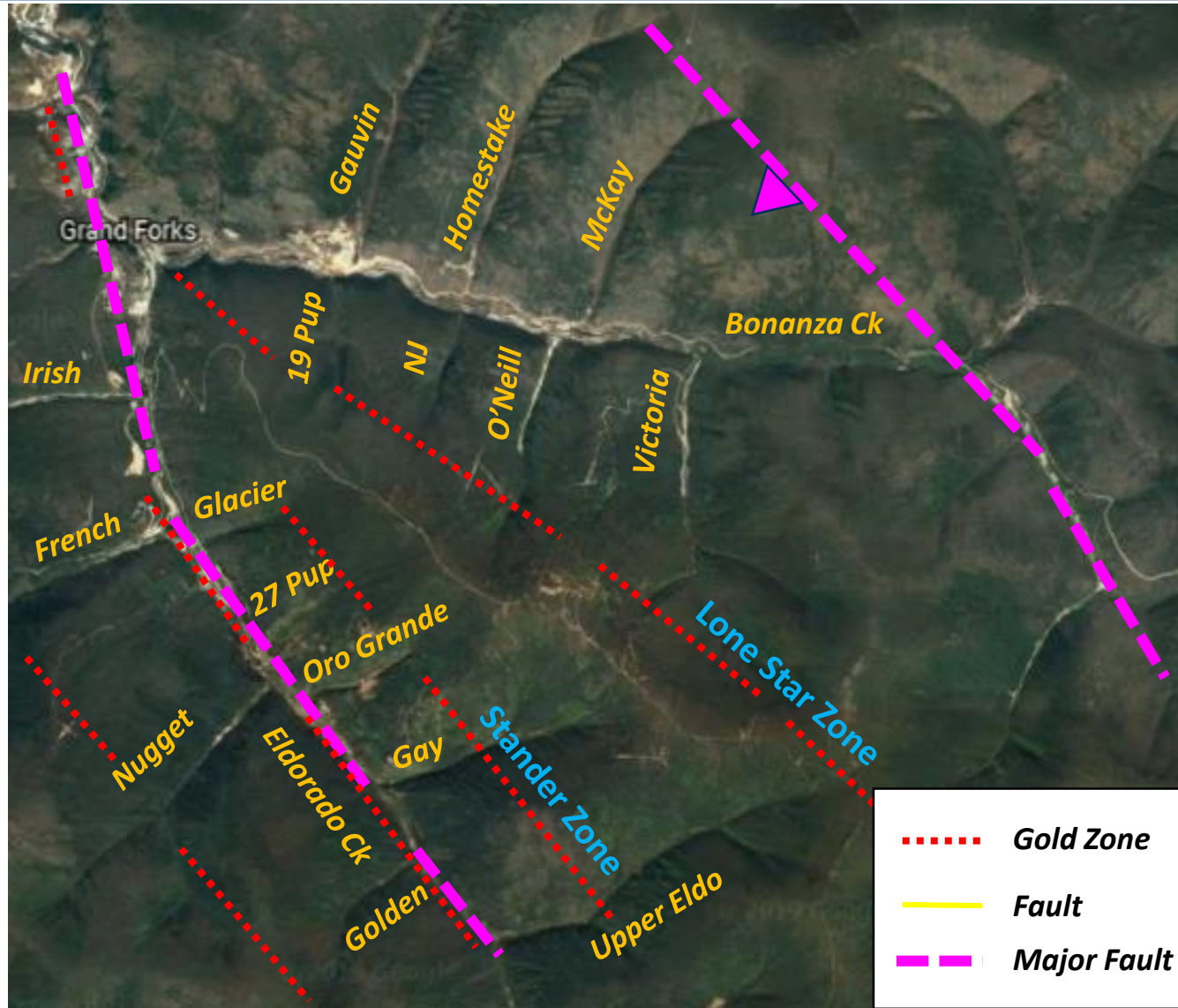
Figure 30: 1VD Airborne Magnetic Data Over the Sulphur Creek Area Showing Eocene Dykes as Deep Magnetic Lows

GLACIAL EXTENTS c. 3 Ma to 22 Ka



- Landscape is not significantly changed from c. 100 Ma to present.
- Drainage morphology is preserved
- Faults created the Klondike 'sluice box riffle' Creeks and Gulches
- Placer gold is locally sourced, particularly coarse gold.

FAULTS CREATE LANDSCAPE: D3 CREEKS



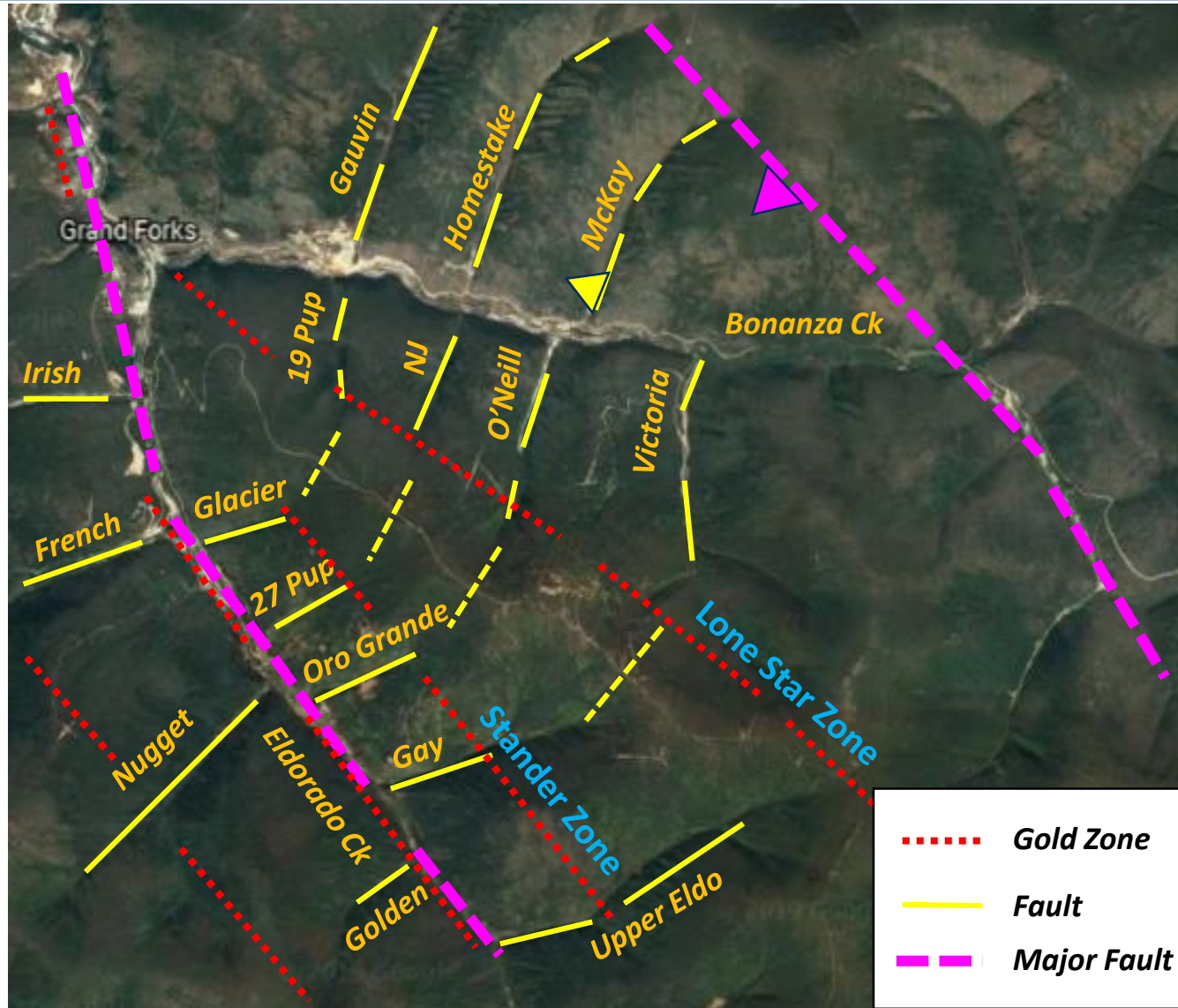
Faults created the Klondike 'sluice box riffle' Creeks and Gulches.

Zones of surface fault 'weakness' funnels draining water, causes differential erosion, locating creeks.

- Major NW thrust faults are the Creeks (D3 / c. 180 Ma)
- Secondary NE faults are the Gulches (D4 / c. 100 Ma)

Both fault directions are gold bearing in bedrock.

FAULTS CREATE LANDSCAPE: D3 AND D4



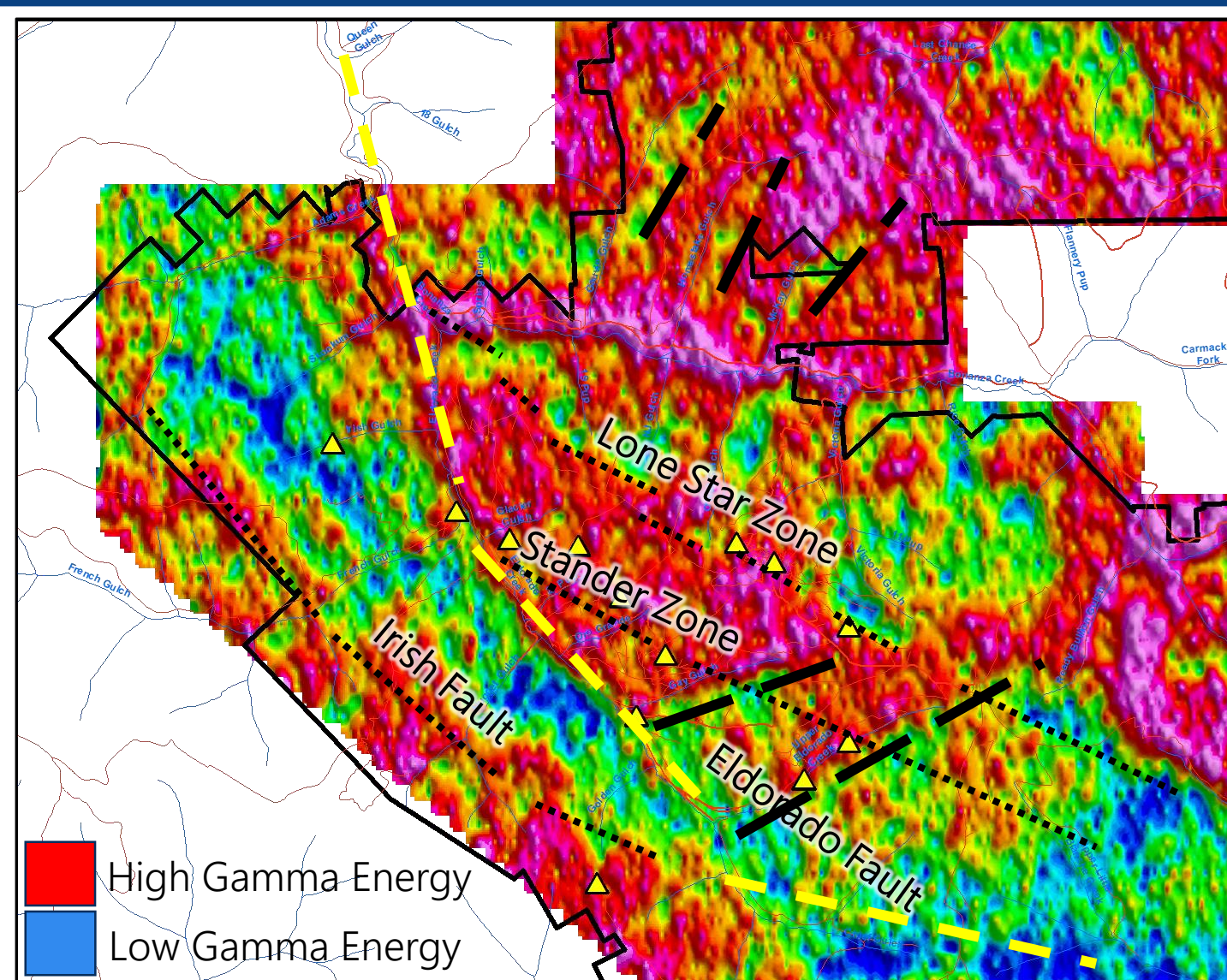
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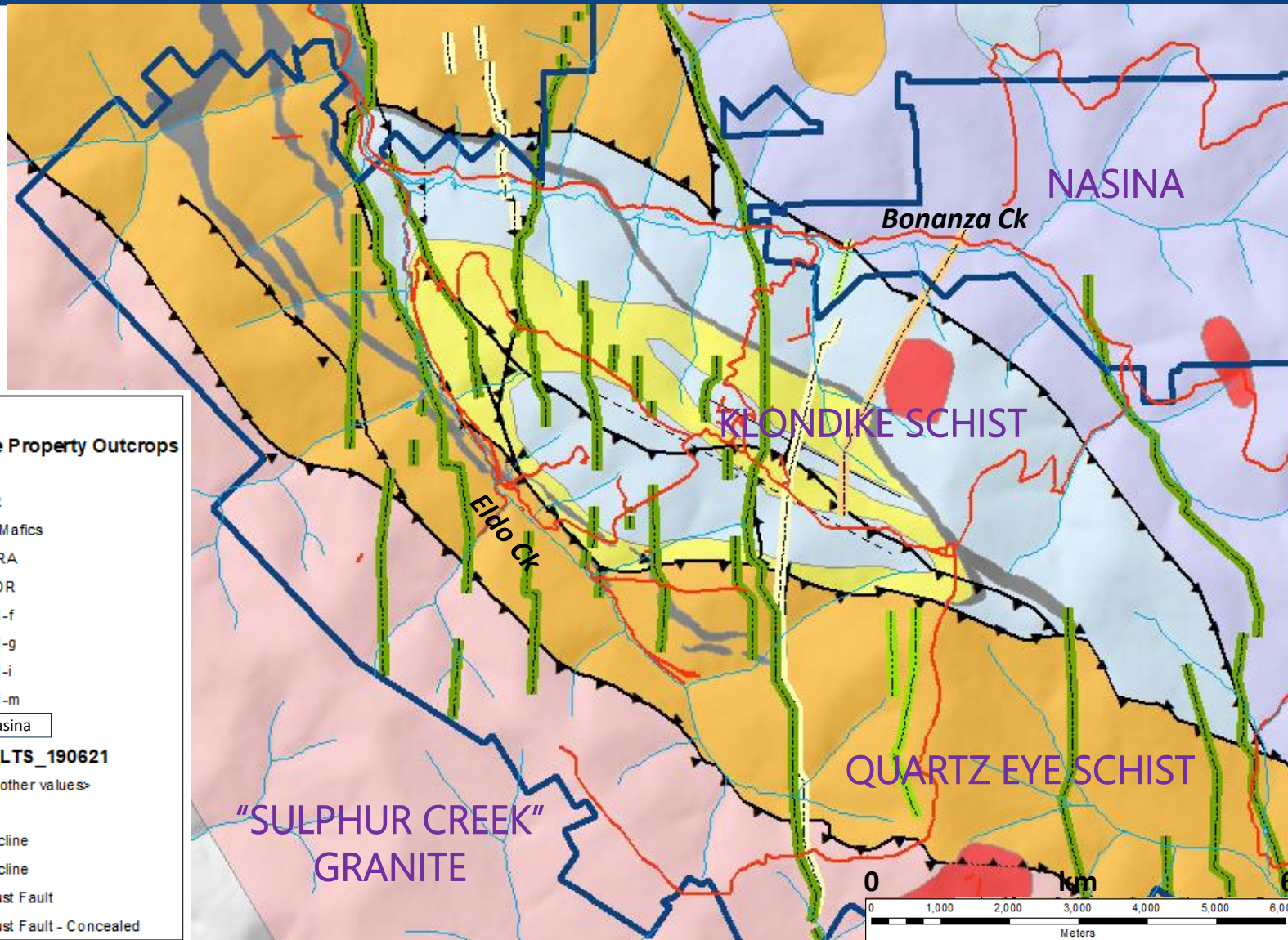
Both fault directions are gold bearing in bedrock.

2018 Radiometrics eU



- D4 NE trending faults (dip NW) correspond with Gulches. (BLACK lines)
- D4 mapped with geophysics
- Geophysically traceable as continuous Gold Zones >5 KM.

KLONDIKE GEOLOGY – NW CORNER



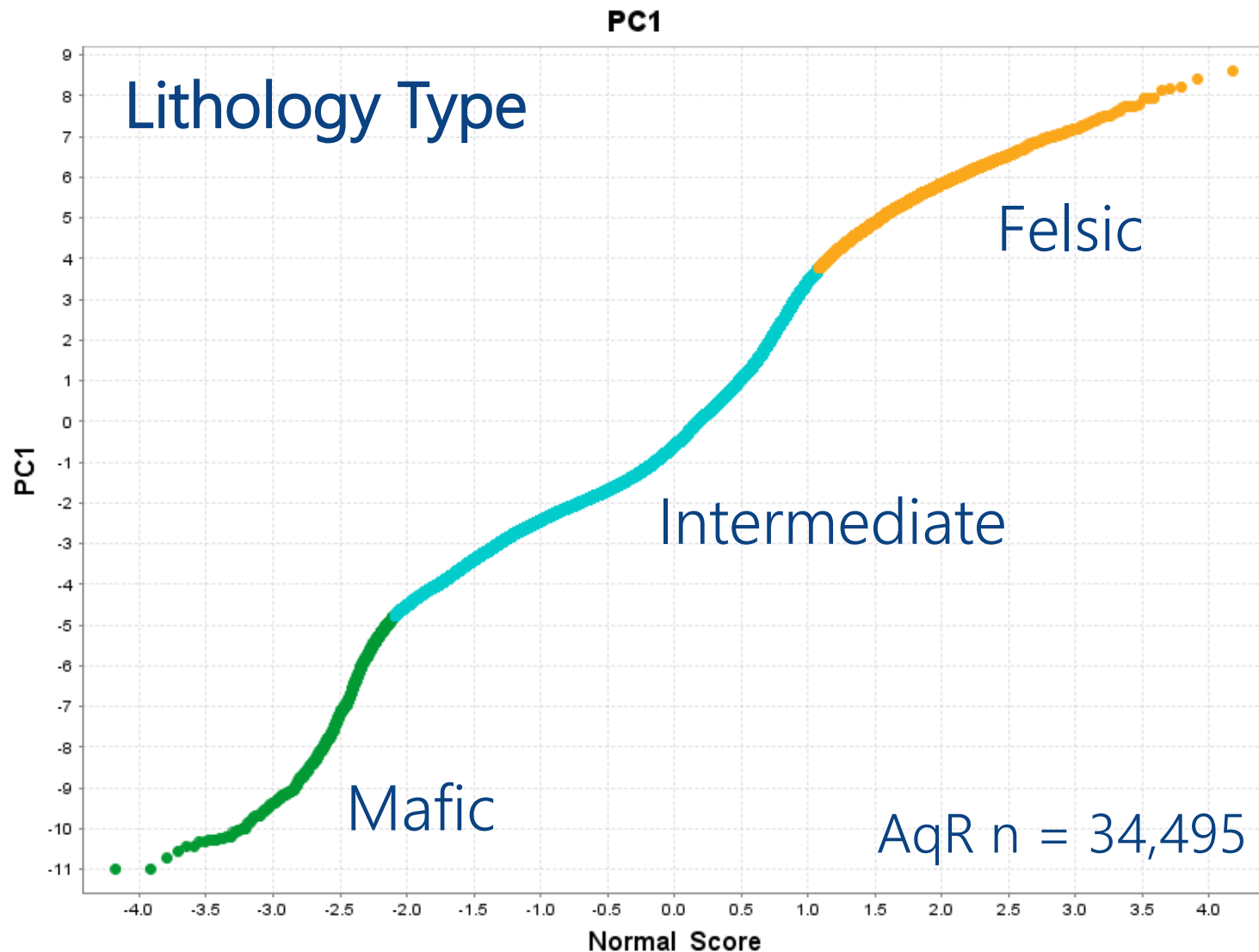
Major structures:

- 1) Klondike Schist 250 Ma/ Nasina 360 Ma
- 2) Sulphur Creek granite / Quartz eye schist / Klondike Schist (?)

Cretaceous intrusives

Bonanza / Eldo NW-SE D3
All "Gulches" NE-SW D4

Mapping: Principal Component Analysis (PC1)



Principal component analysis using scaled coordinates ...

28 components (AqR)
"Dimensionality Reduction"

Easily differentiates lithologies

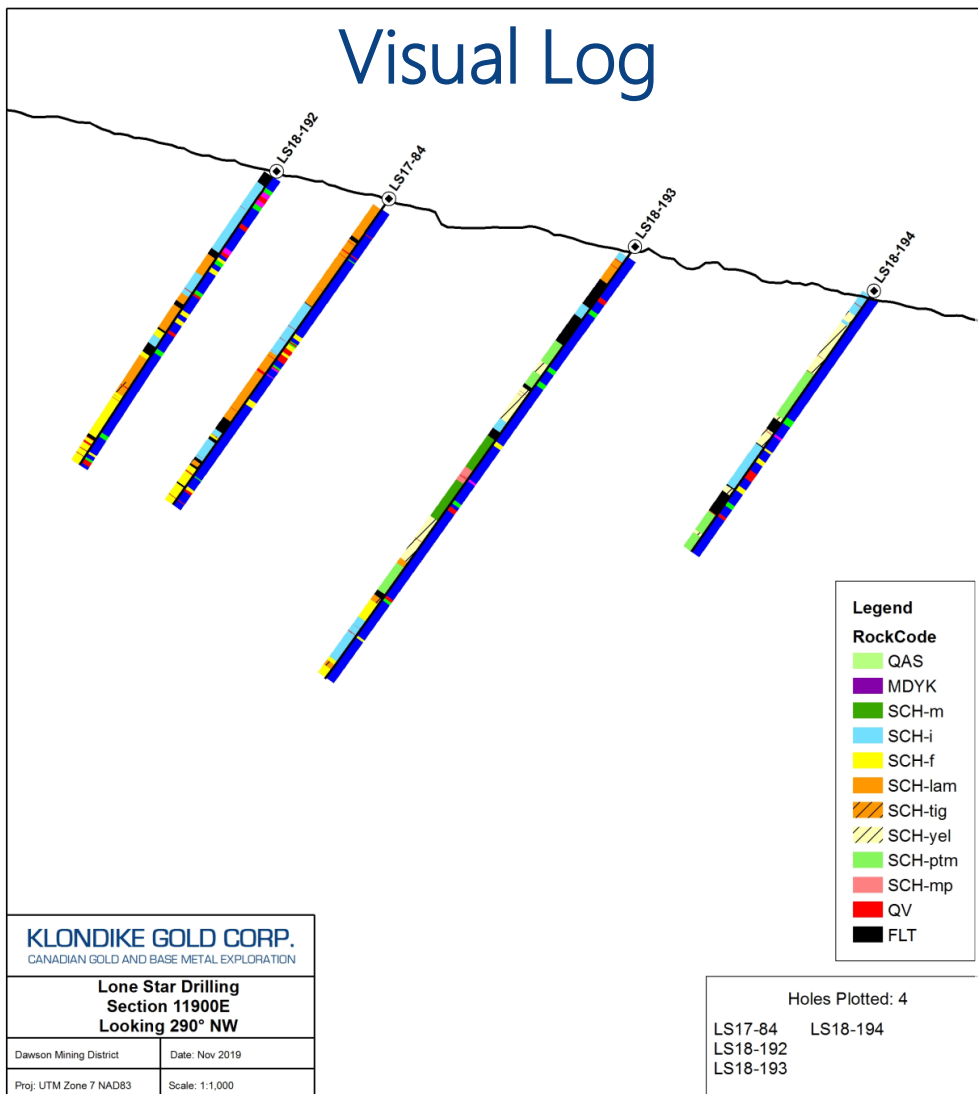
Uses lab standard 'ultra-trace' package analyses for higher precision HFSE

Checked against n=175 'UBC standard' whole rock analyses.

VISUAL vs PC1 CORE LOGGING



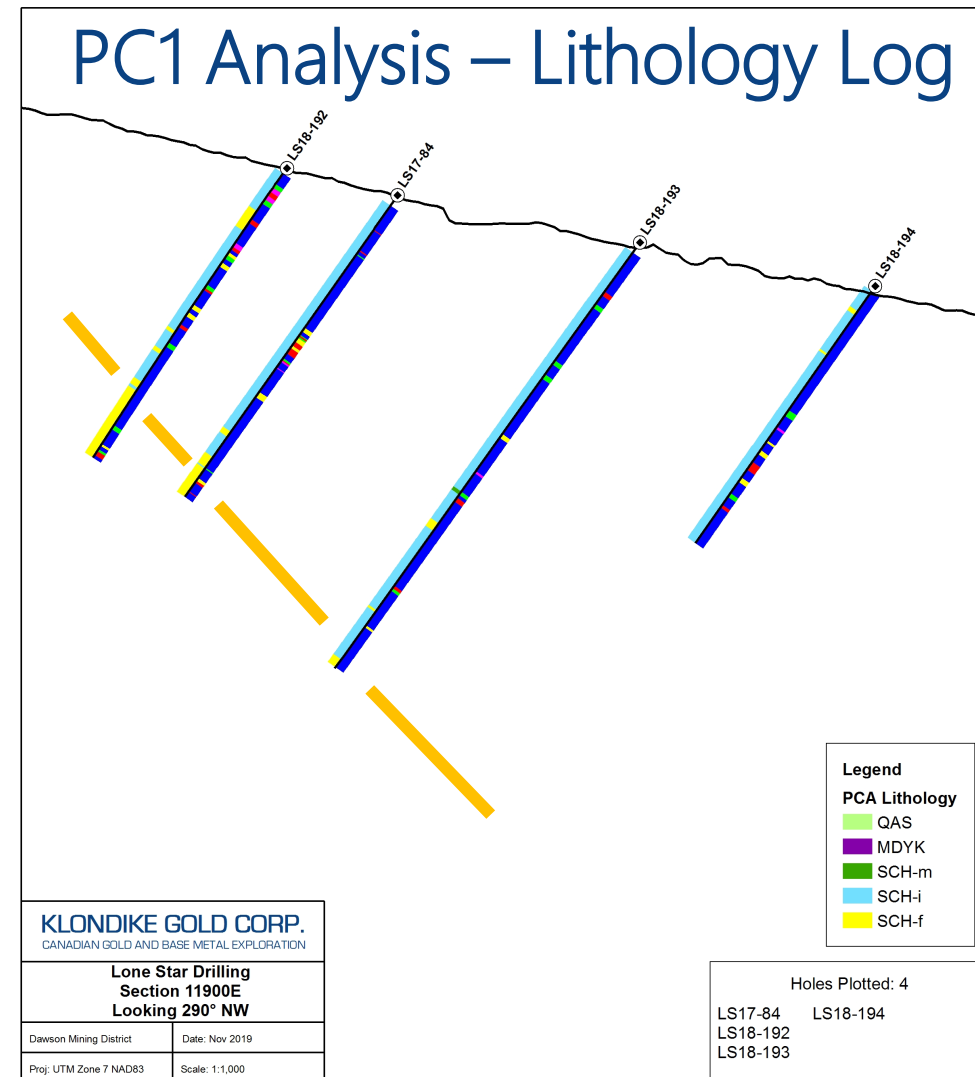
Visual Log



Visual Logs
more effective
at
differentiating
structures

Oriented drill
core also
necessary

PC1 Analysis – Lithology Log



GOLD SIZE FRACTION PER ASSAY RANGE



Assay Range		% Coarse +150 Mesh (0.106mm)			
Total Au g/t		All Zones (n=1493)	Stander	Lone Star	Gay Gulch
0.25	0.50	68%	66%	68%	72%
0.51	1.0	72%	66%	72%	88%
1.01	5.0	82%	79%	82%	93%
5.01	10.0	91%	94%	89%	97%
>10		93%	93%	93%	96%

Metallic screen drill core assay data
2015 - 2018.

- Gold is "coarse" +150 Mesh
- Prelim GRG metallurgical testing at Lone Star Zone: >90% GRG

LONE STAR ZONE GOLD



In the schist typically 1mm size gold.
Quartz veins are rarer cf Stander Zone,
so not that much coarse gold here.



Explains why Upper Bonanza gold
is finer. The source is finer ,,,



STANDER ZONE GOLD: OUTCROP TO PLACER



Outcrop nugget of gold in Upper Eldorado Creek (below).
Placer nuggets of gold from 1 km downstream (left)



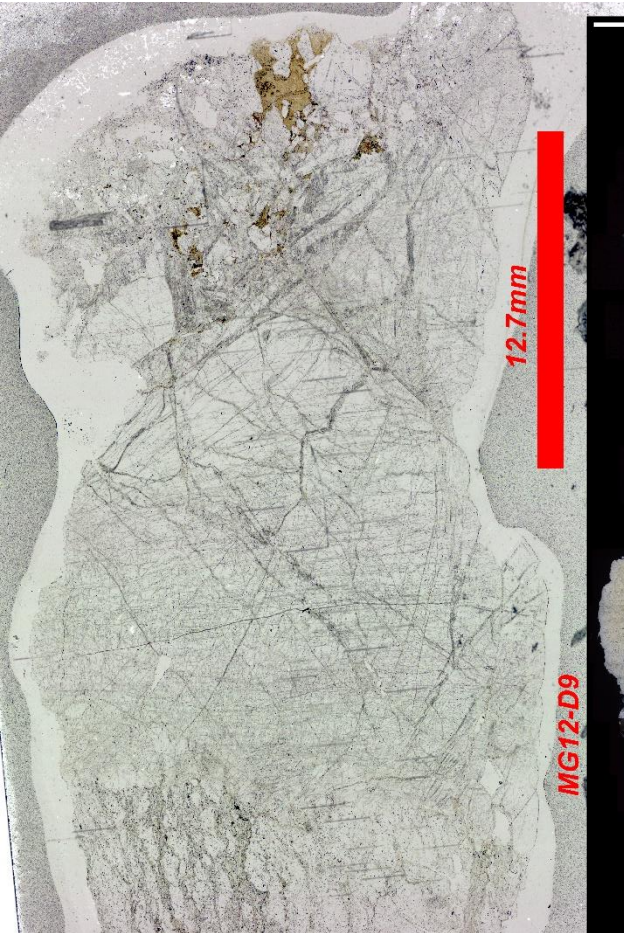
Upper Eldorado Creek is D4, Stander Zone is D3; nugget comes from intersection of the two. QV's host coarse gold



QUARTZ PARAGENESIS



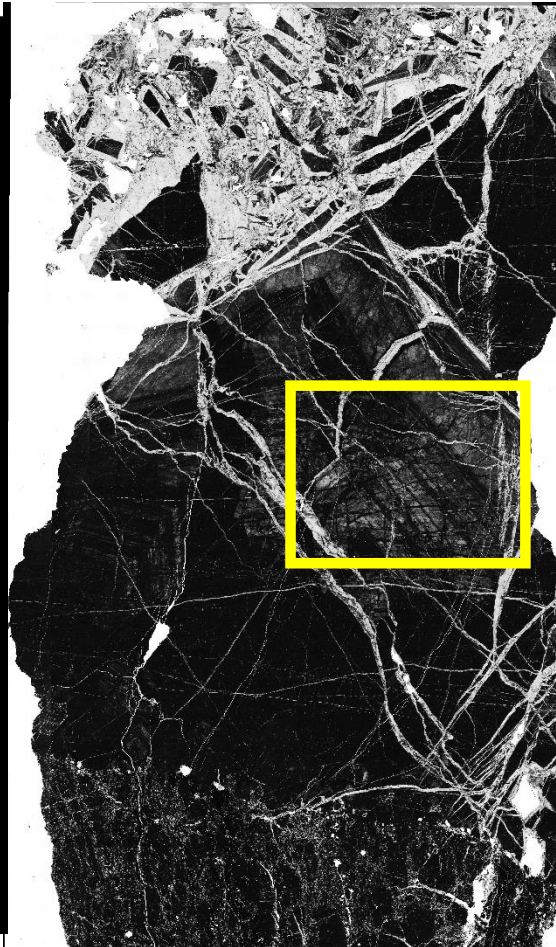
PPL



XPL



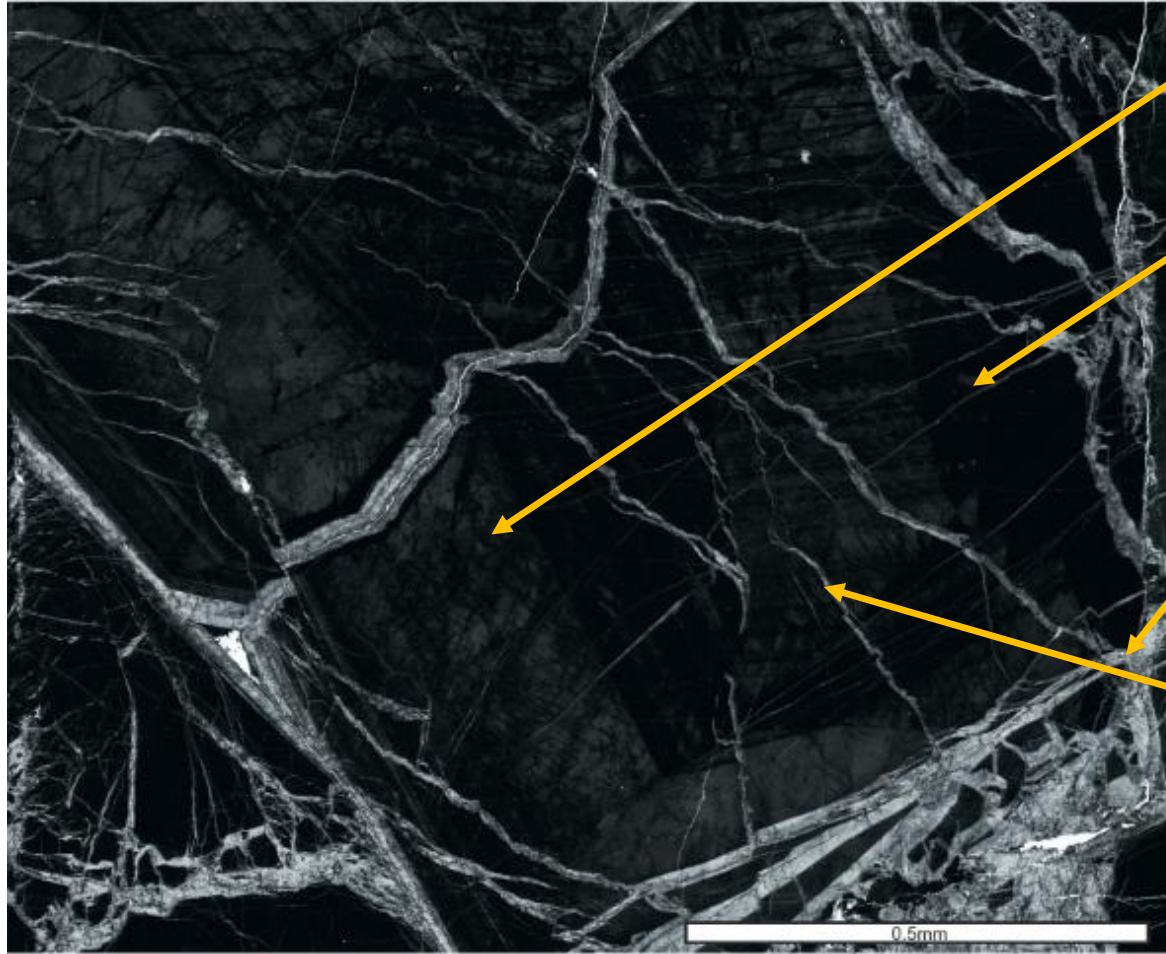
Cathode
Luminescence



Vein textures are
visually 'cryptic'

M. Grimshaw, Leeds U 2017 PhD

CATHODELUMINESCENCE D3 AU QUARTZ VEIN



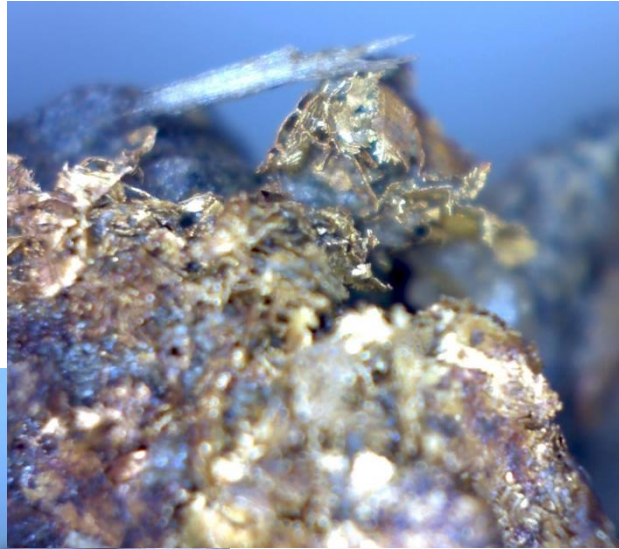
- Q1 – Large euhedral crystal of quartz
- Q2- Black in CL. Fractures and infills the majority of the vein. This is subhedral milky white type
- Q3 – Bright CL which fractures and brecciates: hydraulic fracture
- Q4 – Bright CL thin x-cutting all: gold-bearing.

Low lithostatic pressure. Implies near-surface high-crustal level (the top) of the orogenic gold veining.

Potential for kilometers of depth extent.

M. Grimshaw, Leeds U 2017 PhD

D4: STANDER ZONE GOLD/ELECTRUM



Electrum D4 Vein:

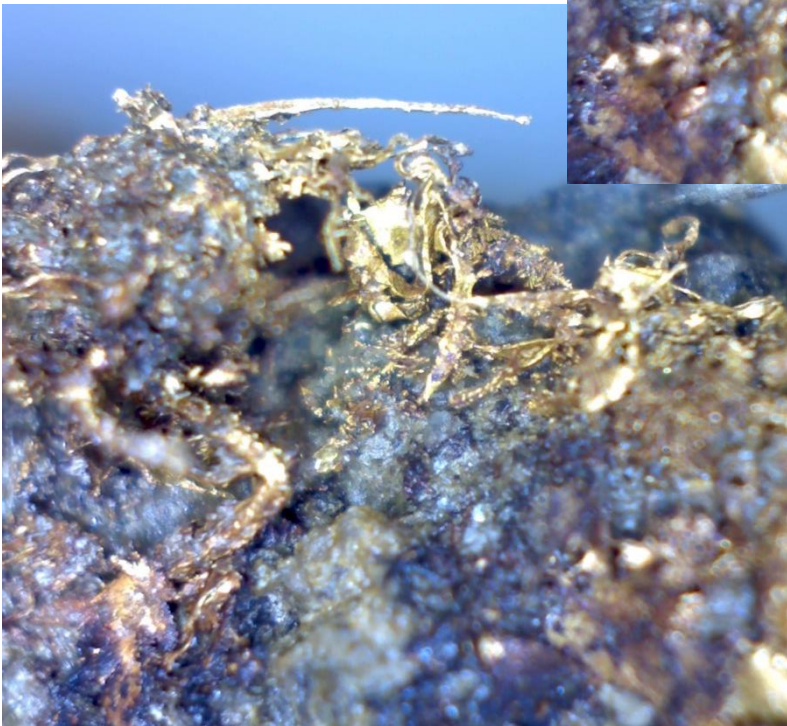
1,009 g/t Au with 1,036 g/t Ag over 1.0m

“World class drill hole”.

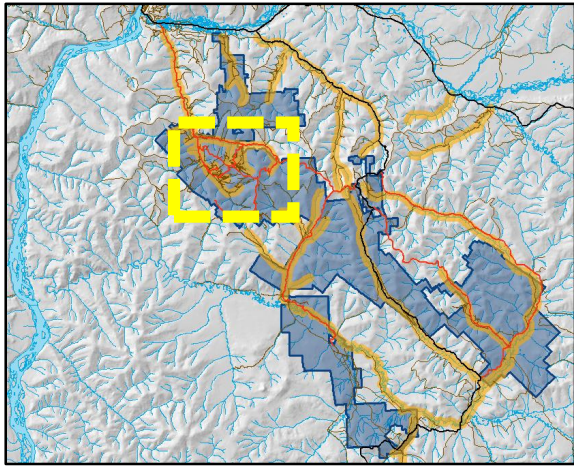
2nd best hole drilled in the world in August.

3rd best drill hole in Canada in 2019.

(Source: Mining Intelligence / Mining.com)

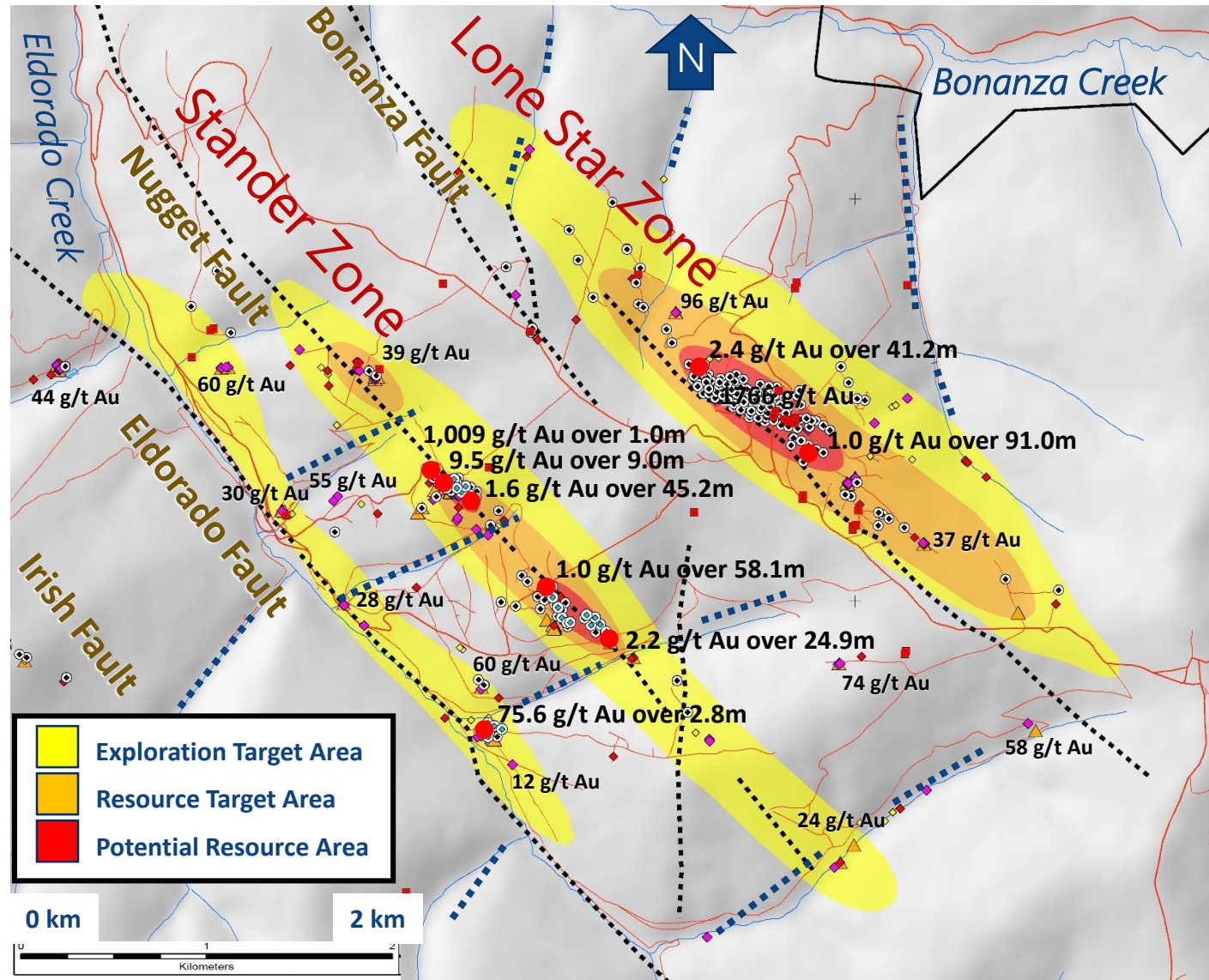


POTENTIAL FOR FURTHER DISCOVERY ...



Fraction of property explored.

~10%



All Zones open and prospective.

Recognition and mapping of D4 conduits expands the gold discovery potential of the District.

THANK YOU



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