



Geometallurgy Learnings from First Quantum Minerals' Zambian Operations

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CONTENTS

- Organisational
 - Introduction of Kansanshi
 - Geomet at FQM
 - Importance of buy-in across the org chart
 - how do you get that?
- Technical case study
 - Ore hardness characterisation at Kansanshi
- Practical take-aways



Kansanshi Mine,
Solwezi, Zambia



Enterprise
Mine (Nickel);
Sentinel Mine
(Copper)

53Mtpa

2025 guidance:

- 160-190kt Cu;
- 100-110kOz Au

Expanded production

- up to 250-270kt Cu

G

Game park





COMPLEX ORE....



Variable local
oxidation &
Cu mineralogy

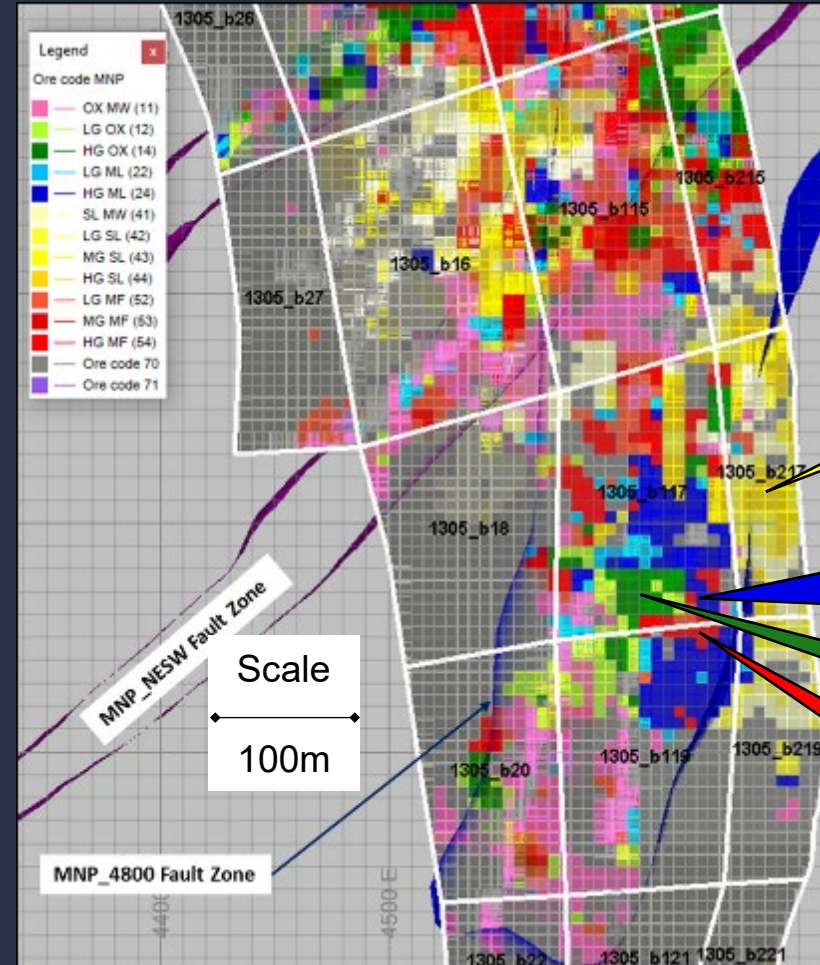


High grade
veins vs.
strat. impact
on estimation



Structures &
weathering
(173 m)

Horizontal section of the M15 cutback (10x10m grid)



Medium grade
Sulphide

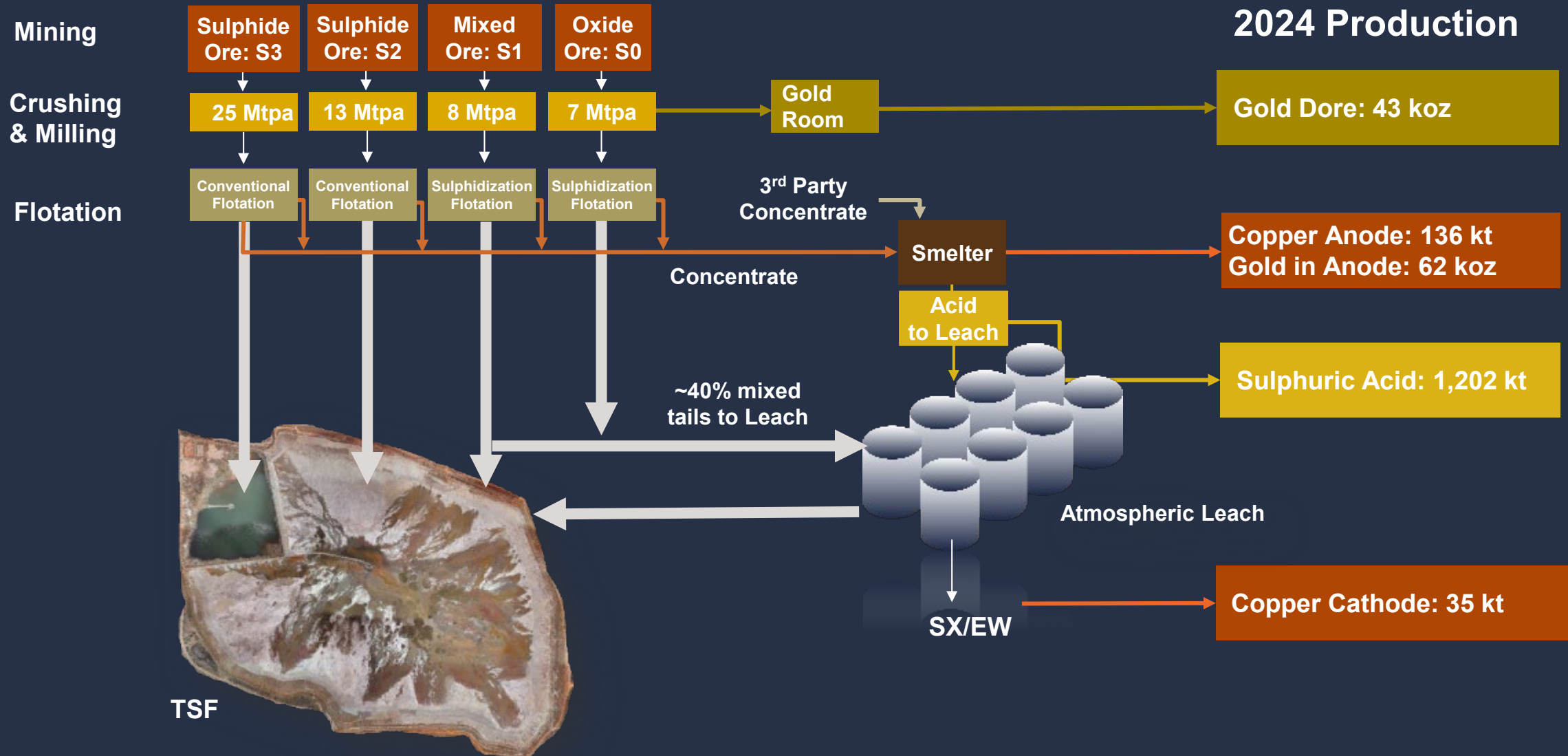
High grade Oxide
with High Gangue
Acid Consumption

High grade
Oxide

High grade Mixed

More than 12 ore codes

... AND A COMPLEX PLANT

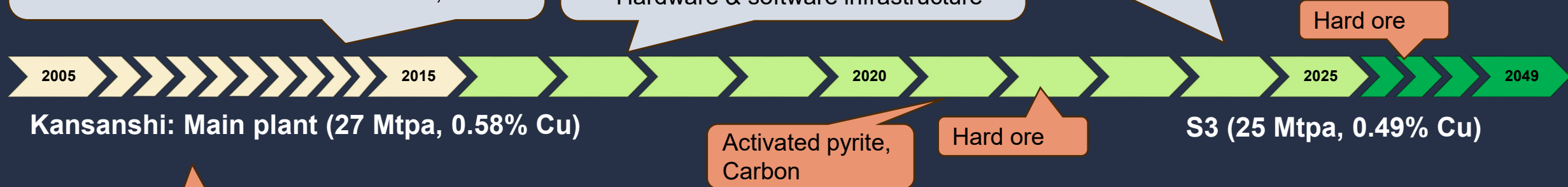


EVOLUTION OF GEOMETALLURGY AT FQM ZAMBIA

- Ore classification scheme ~14 ore types
- 10x10 grade control drilling
- Predicted recoveries based on TCu, ASCu

- Mine-to-mill optimisation
- On-site automated mineralogy
- Hardware & software infrastructure

Formalized “Geomet” programme with support from management

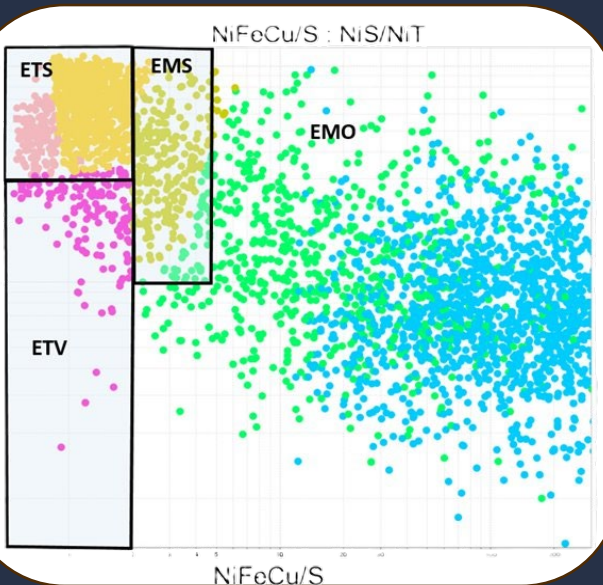


CPS for transitional ore

Carbon in concentrate

- 2 ore types (OTA, OTB)
- Hardness domains
- Carbon proxy in block model

Hard ore

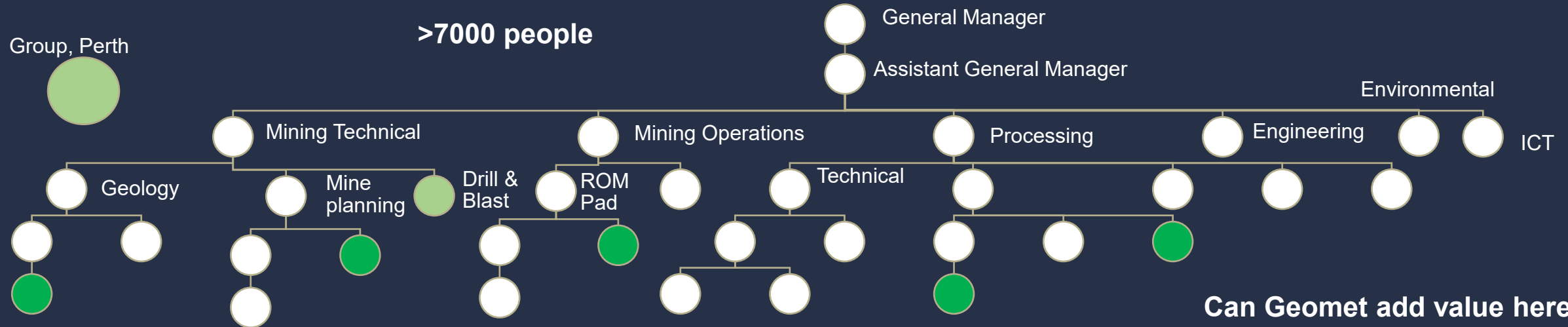


Geomet
Talc (5 – 60%?); pyrite
Ni deportment to sulphides
Element to mineral conversion
for ore classification

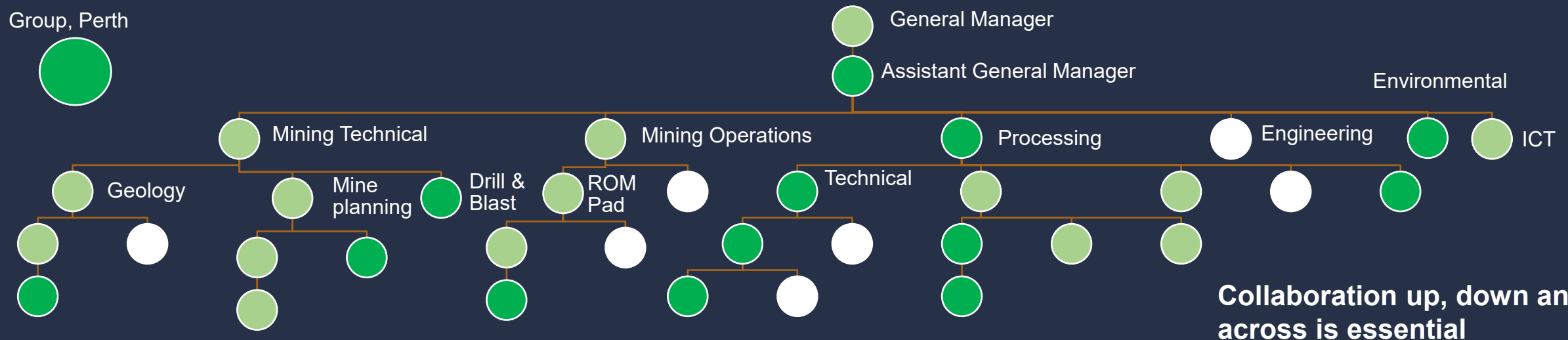
Integrated – Mining, Geology,
Processing Conc sales



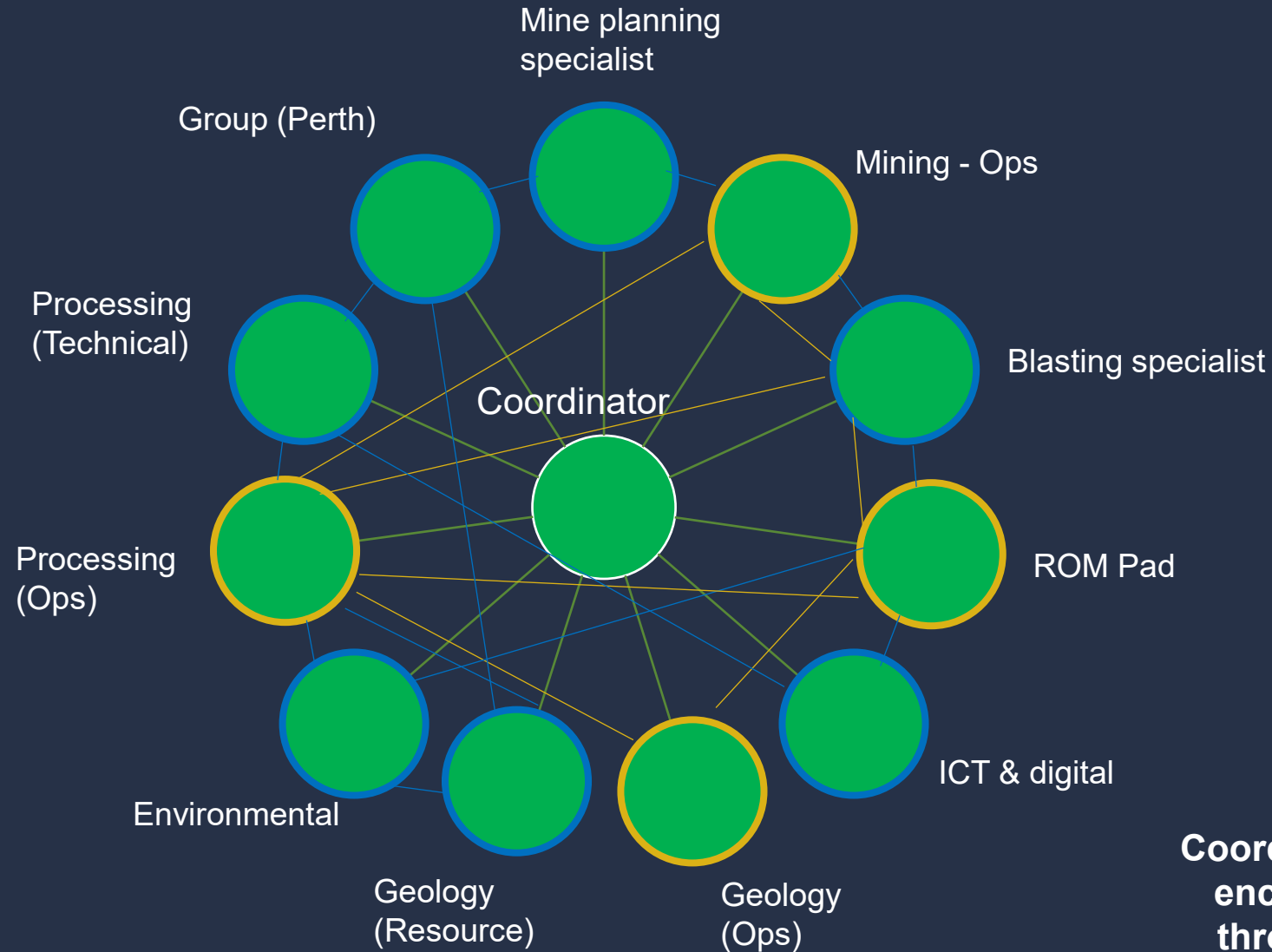
ORGANISATIONAL BUY-IN



- How it feels now



NEW STRUCTURE CONCEPT & COORDINATOR ROLE



**Coordinator (with management support)
encouraging collaboration, breaking
through the hierarchical constraints**

KANSANSHI SITE GEOMET PROGRAM (2024 TO DATE)

Objectives

- Collaboration towards understanding & optimisation across the value chain (& improved forecasting)
 - Mine to mill – fragmentation vs. dilution
 - Stockpile management
 - Acid balance
 - Environmental ARD risk management
 - Process mineralogy informing process optimisation (flotation, leaching, high pressure leaching, gold)
 - Hardness characterisation

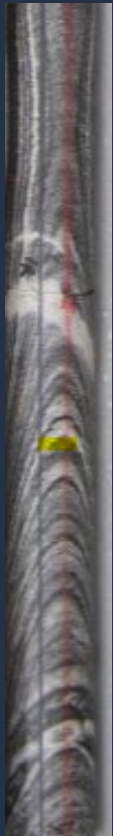
Hardness characterisation objectives (case study)

- Quantify hardness expectations for S3 feed sources to predict throughput variability
- Determine requirement for S3 secondary crusher
- Identify proxies for hardness (chemistry, mineralogy, lithology, RC-drilling penetration rates)



HARDNESS CHARACTERISATION - LITHOLOGIES

Kansanshi Tectonostratigraphic Section

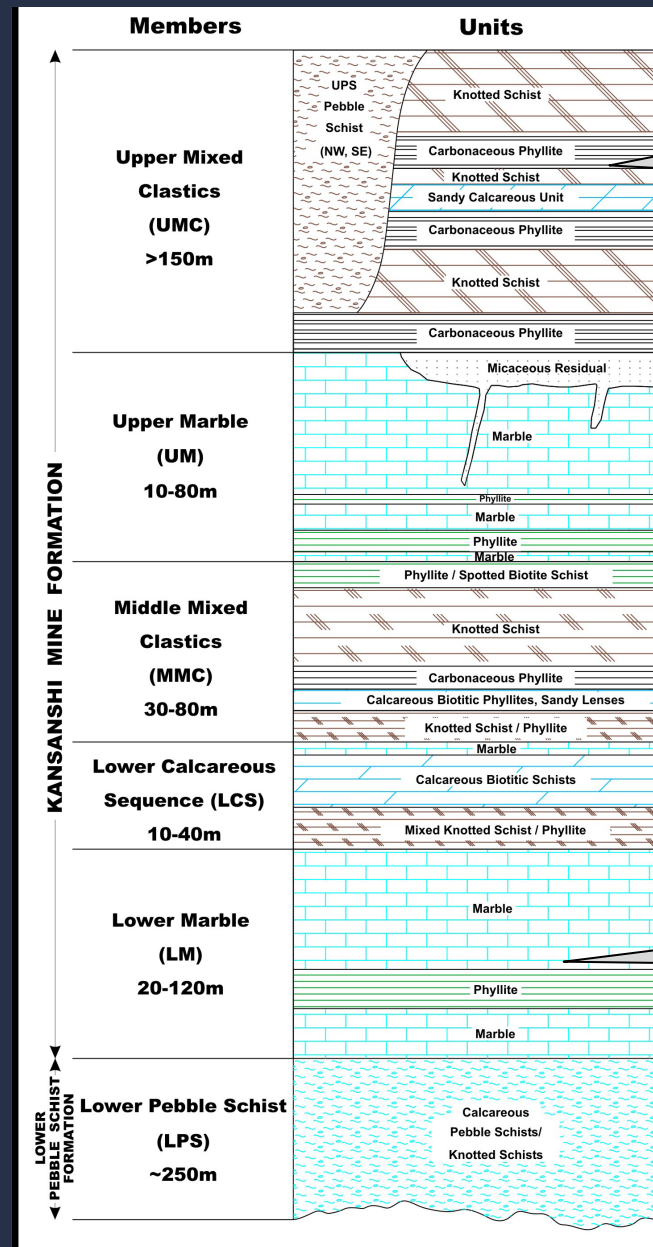


Stratigraphic sequence

- Layers of marble & phyllite/ schists
- Continuous
- In the block model

But...

Variable proportions of different rock types in single "strat"
Similar rock types occur in different strats

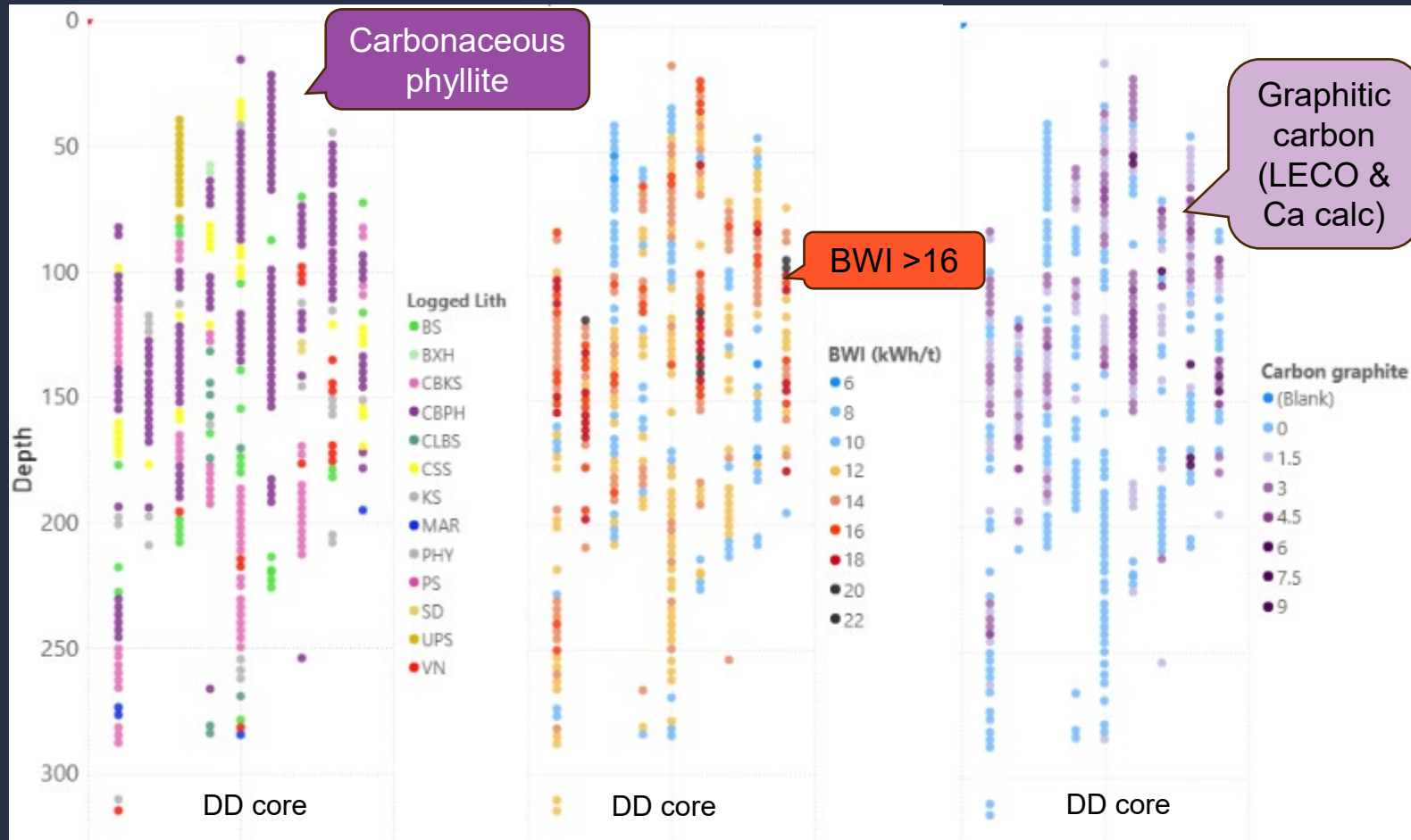


UMC which is key Stratigraphic unit for new pit was much less significant in other pits/ was on the surface/ weathered

- Lithology domains aren't continuous
- More complex
- Too many of them...
- But feature of interest for geomet

Carbonaceous phyllite in here was a problem in 2022

HARDNESS CHARACTERISATION - SCOPE



9 x targeted DD Holes,
Wireline logging
(Mag susceptibility,
conductivity etc.)

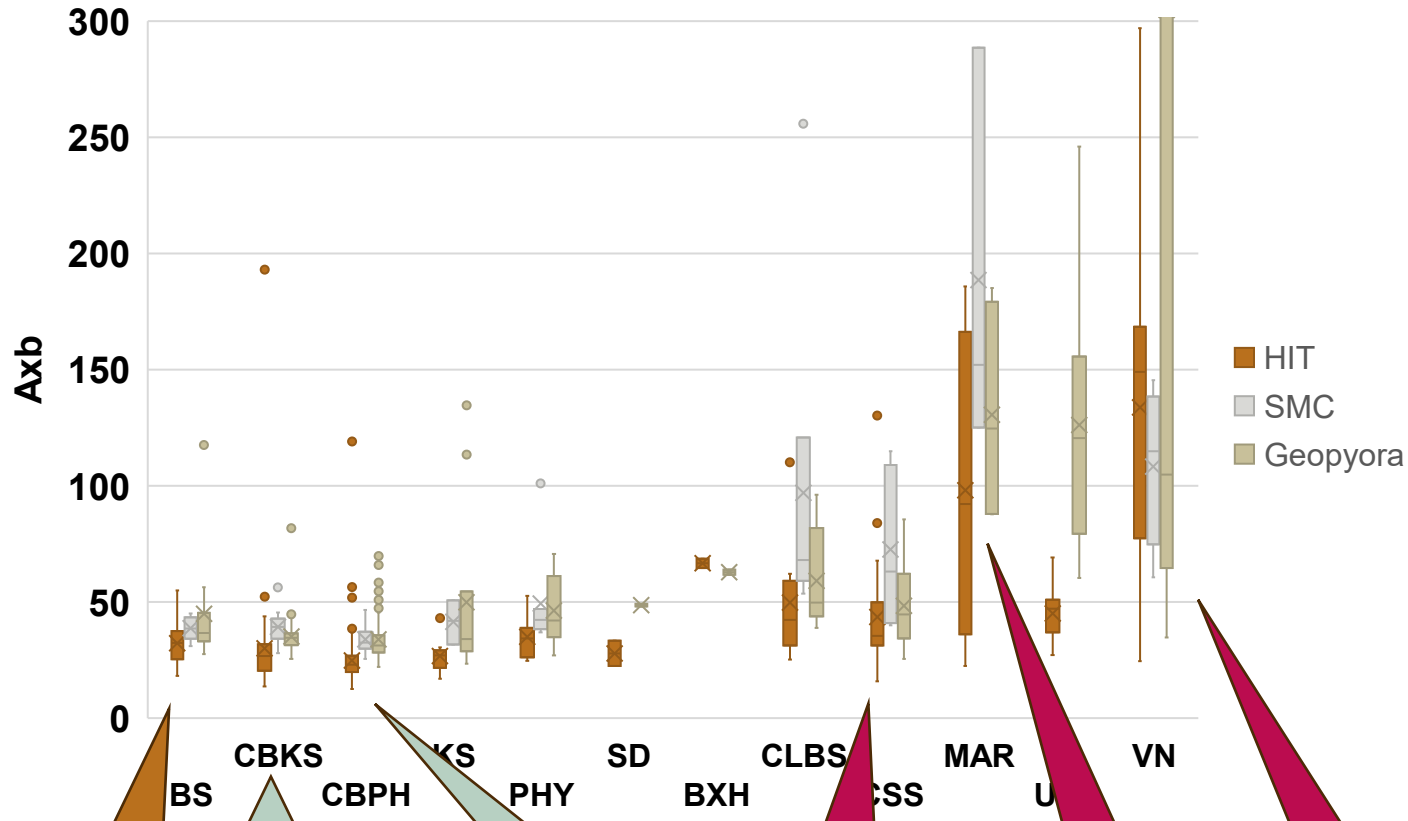
Core photographs
Visual lithology logging
(Each point represents a
3m sample)

Hardness characterization
Geopyora, SMC, HiT

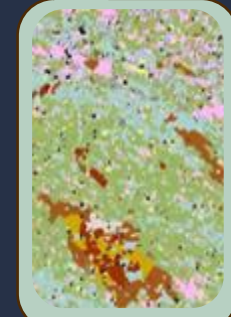
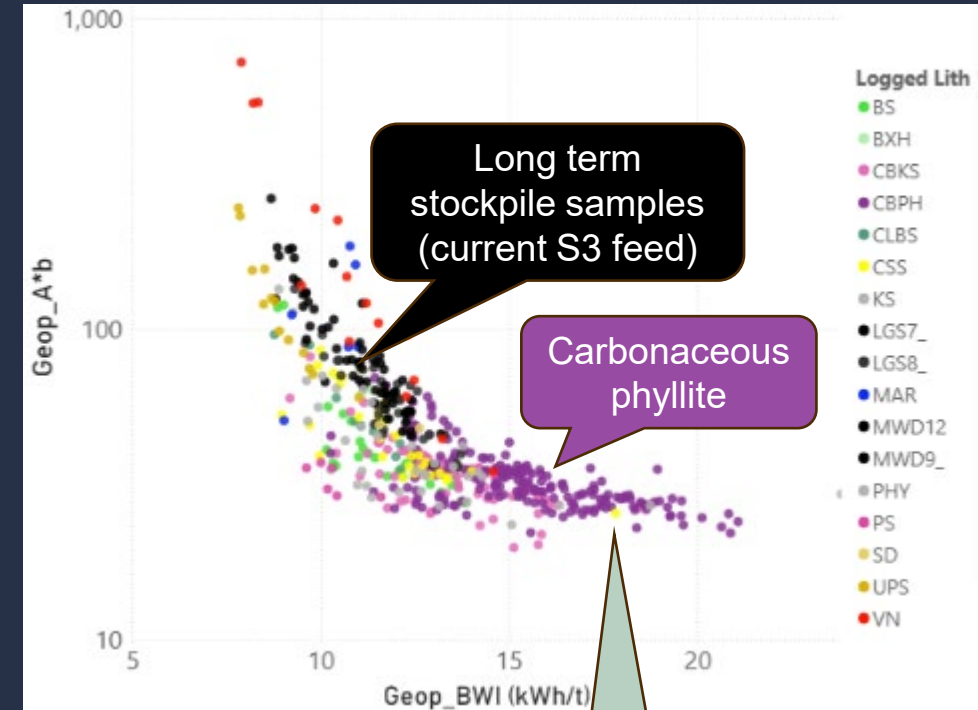
Multi-element assays
Auto-SEM mapping

HARDNESS CHARACTERISATION – DIFFERENT METHODS

Hardness Results from SED Drill Cores



- ~400 for proxies
- ~90 for SMC & BBWI



HARDNESS CHARACTERISATION

Progress to date:

- Carbonaceous phyllite (CBPH), visual logging = hardest domain
- Key lithology groups added to geological block model
- Blast optimisation by lithology (Parallel workstream, excellent progress)

Key gaps

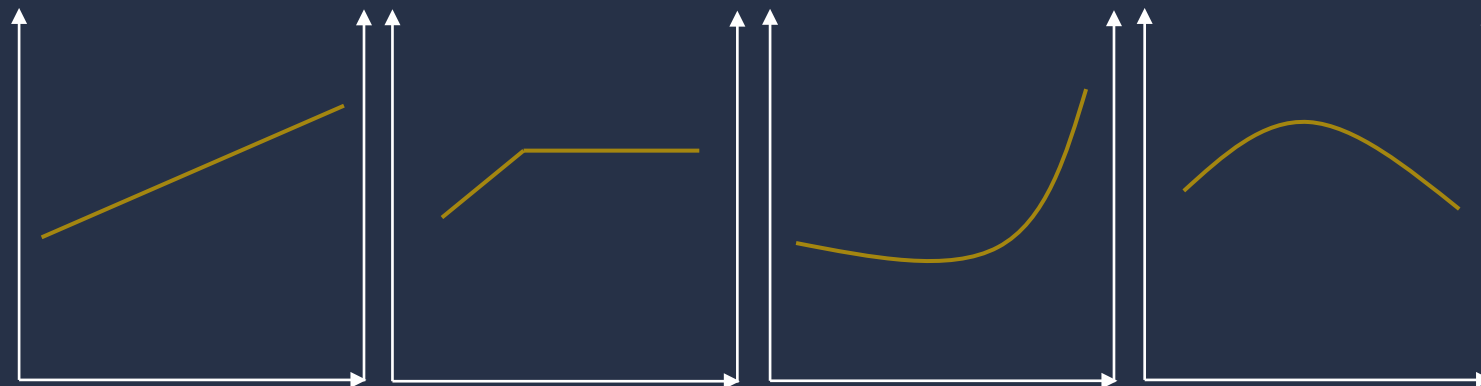
- Accurate estimation of throughput based on hardness measurements

Next steps

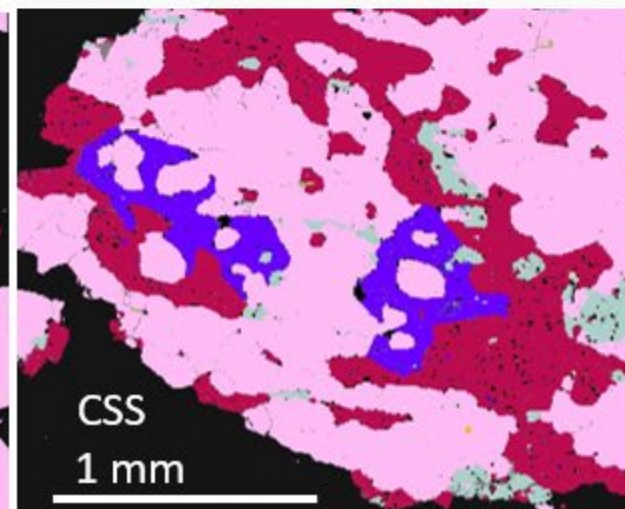
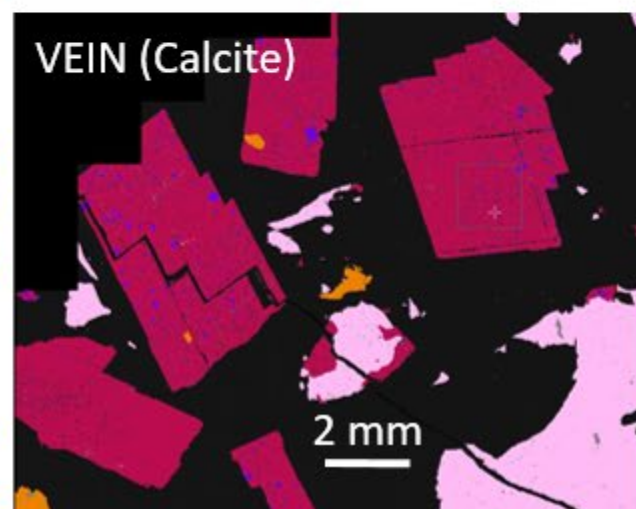
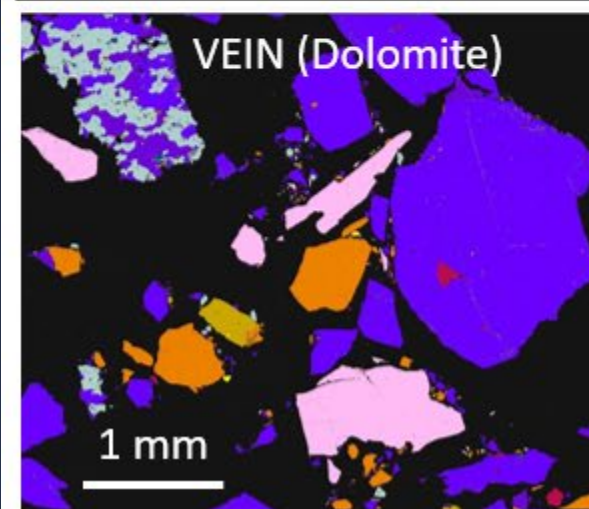
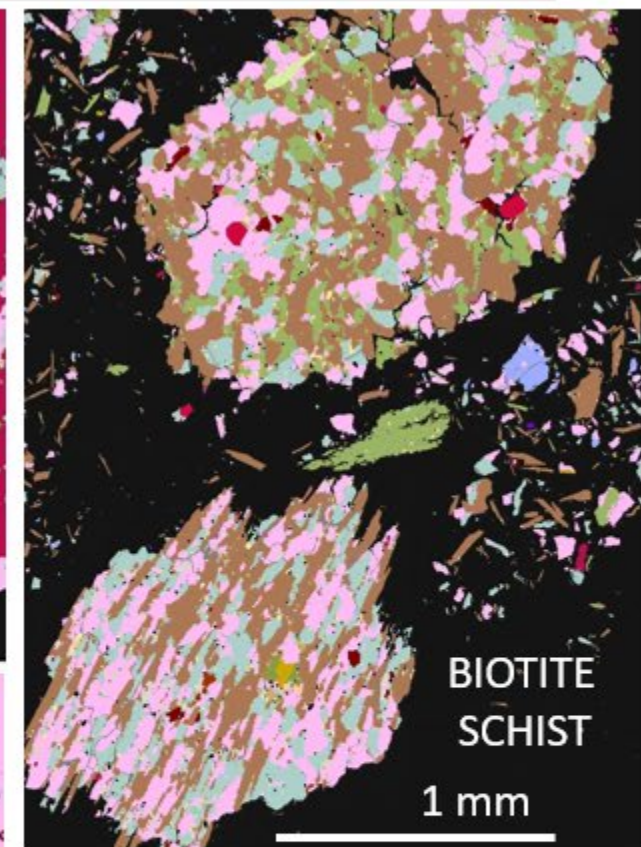
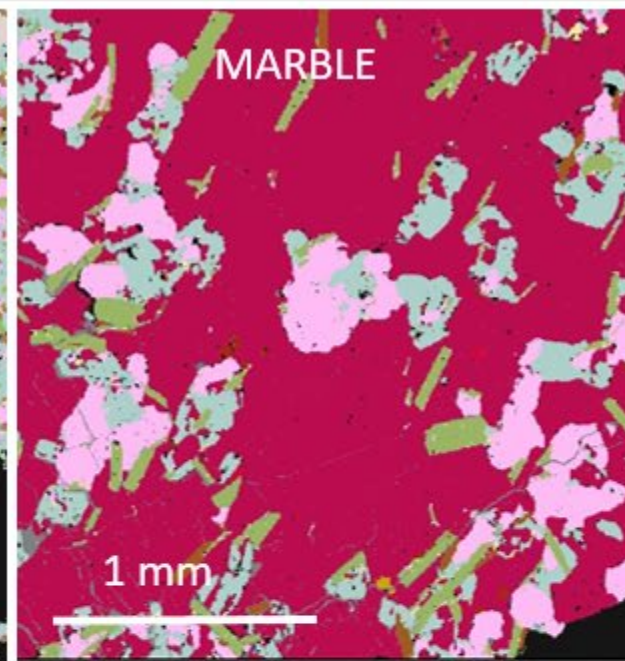
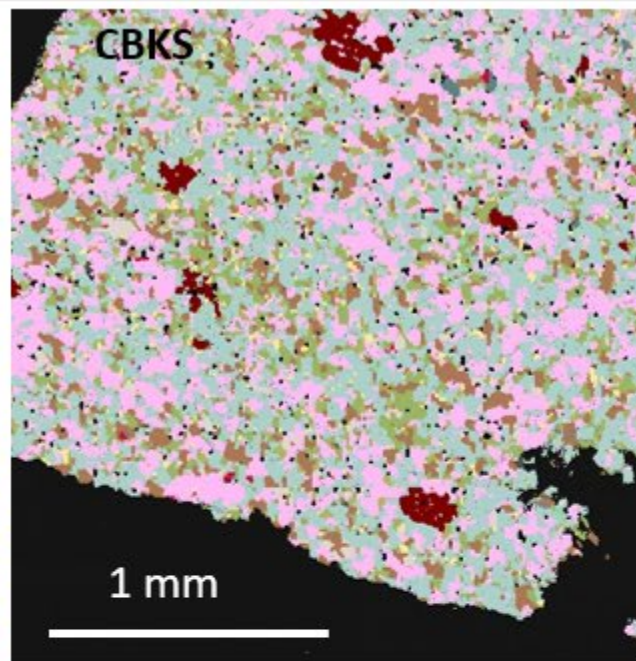
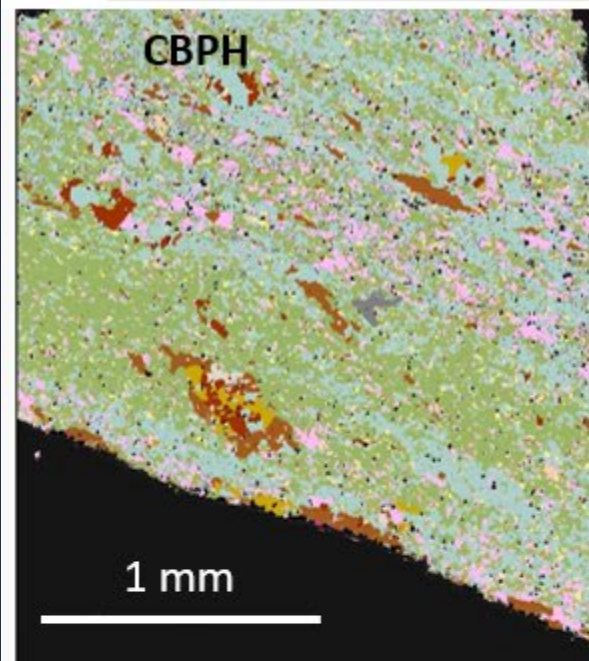
- 3-day trial in the S3 plant with hard carbonaceous phyllite
- Define multiple hardness domains via lithology groups to improve models

PRACTICAL TAKE-AWAYS

- Get the right data – breadth and depth
- Pragmatic approach – outcome driven outside of medium-term planning.
 - NPV impact/driving investment
 - Geology-to-sales
 - Optimisation from non-linear feature/performance curve
- But!
 - Large volume operation – keep it productive
 - FQM way – deliver projects fast – time.
- Broad multi-disciplinary team with Management support – agenda, presence
- People! People! People!



THANK YOU



Texture is important!