Discovery Stories from the Sepon Project

CWEDG

Central West Exploration Discussion Group

Three stories of discovery

Discovering gold

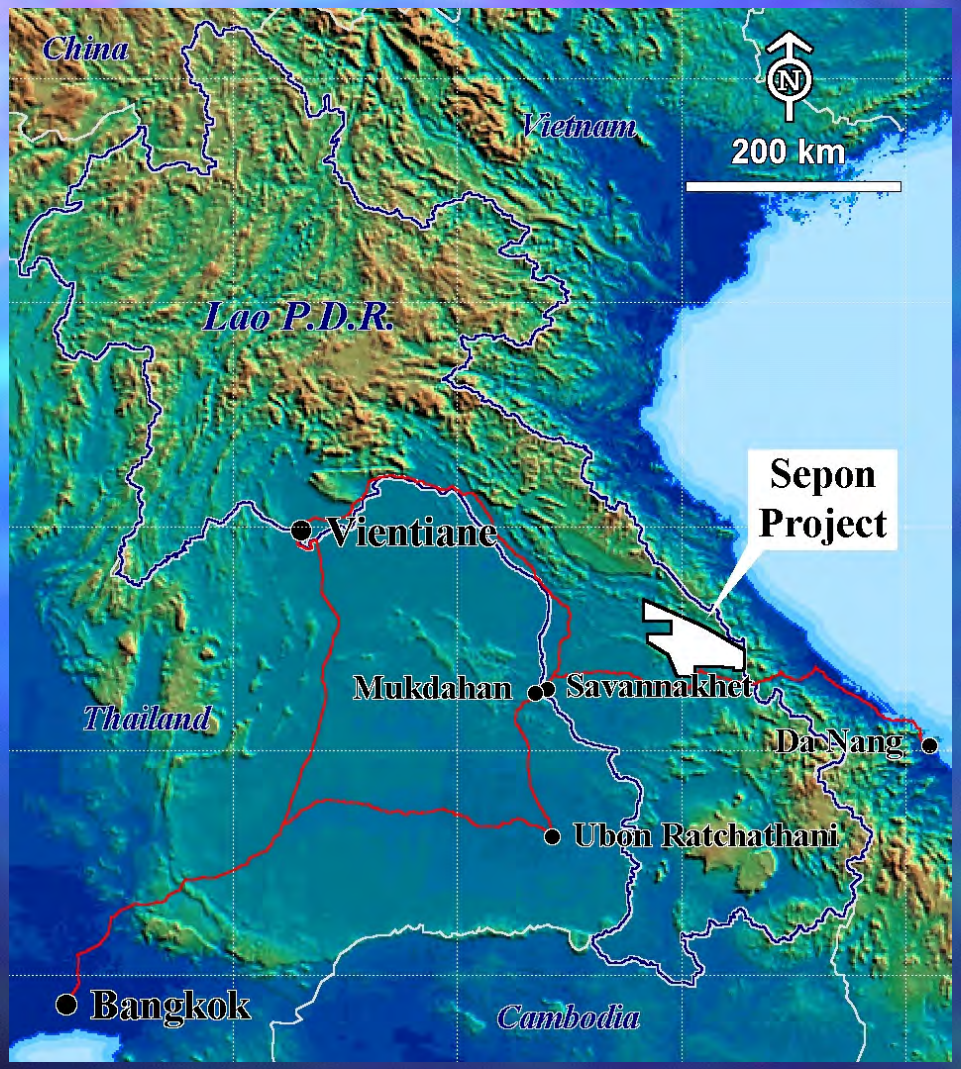
Discovering copper

Re-Discovering

Refreshing the memory

- Cromie, PW (2010) *Geological setting, geochemistry and genesis of the Sepon gold and copper deposits, Laos.* PhD thesis, University of Tasmania.

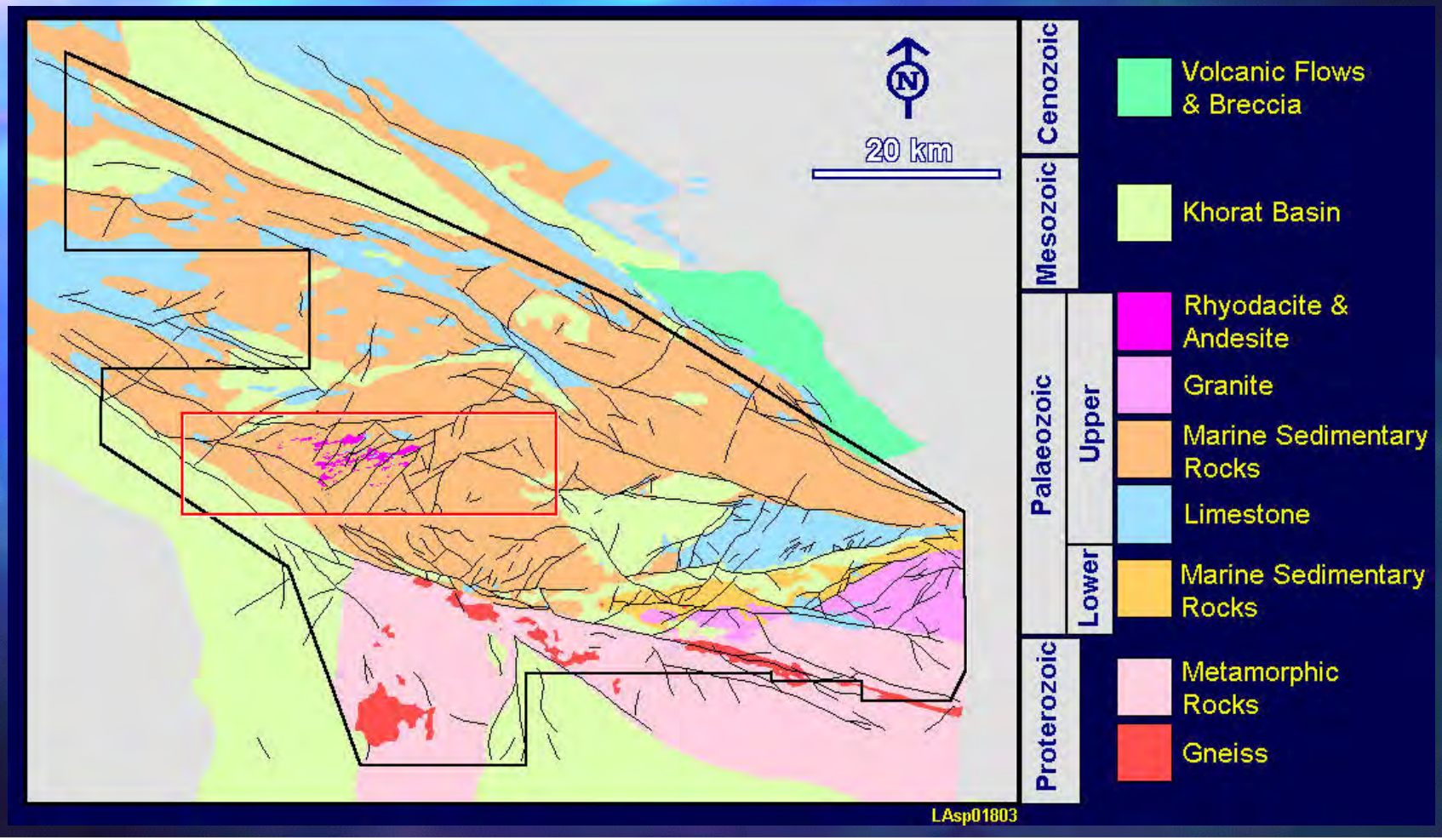
Pacrim, 1999


China
Vietnam
N
200 km
Lao P.D.R.
Sepon
Project
Vientiane
Mukdahan
Savannakhet
Thailand
Da Nang
Ubon Ratchathani
Bangkok
Cambodia

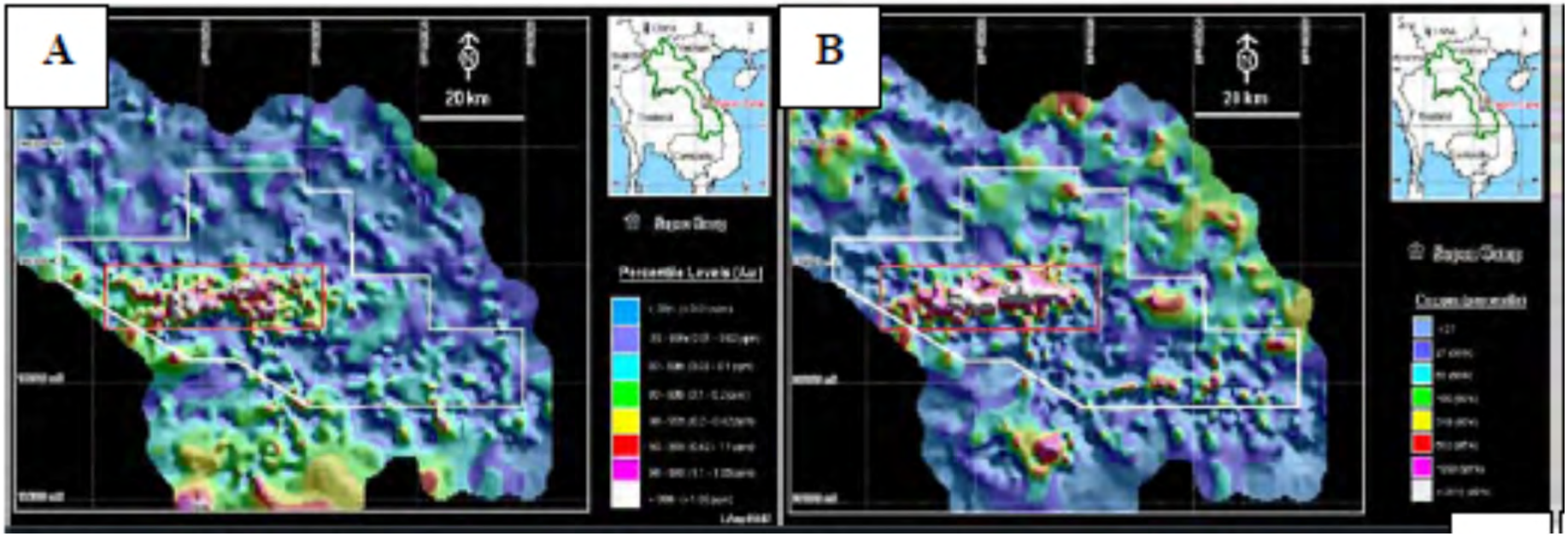
RIO TINTO

Discovering gold

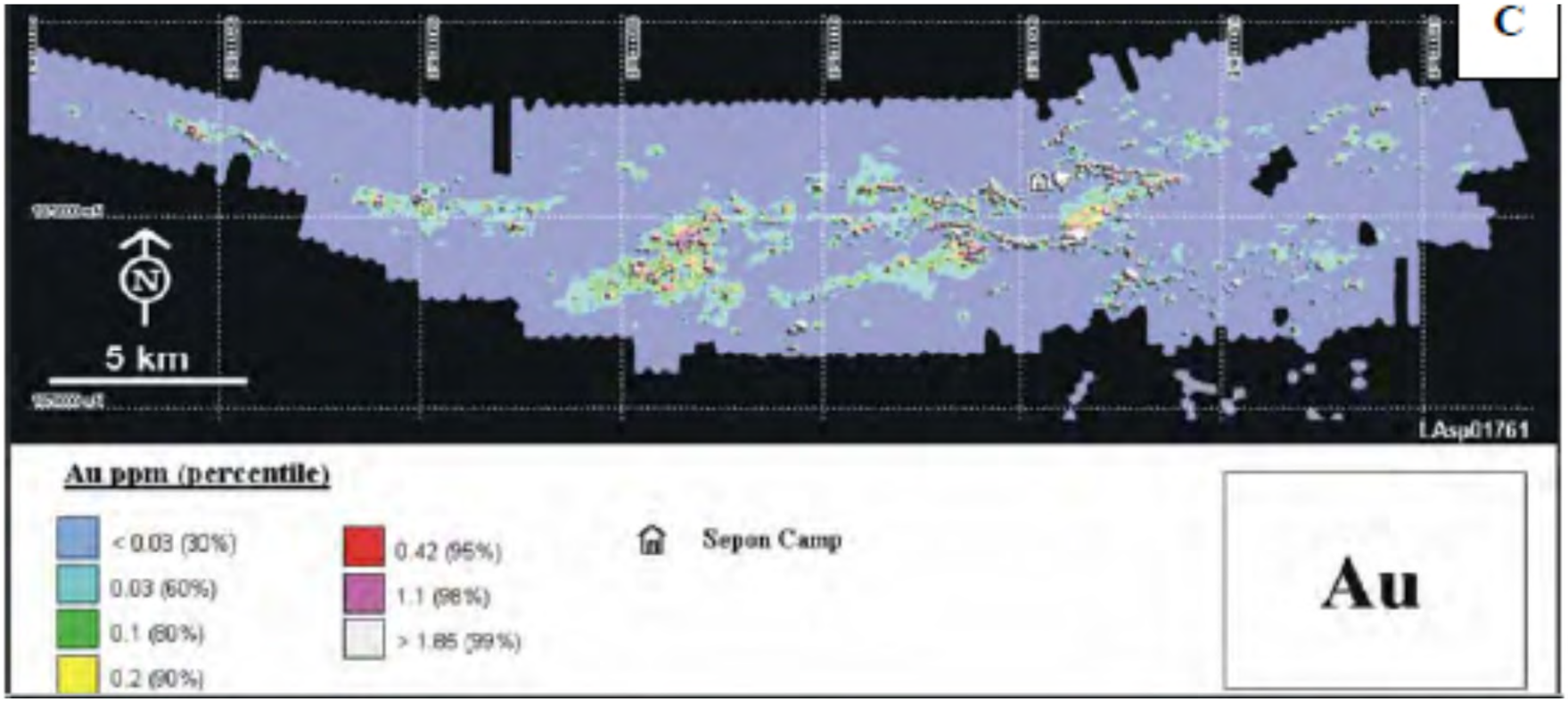
The right ingredients



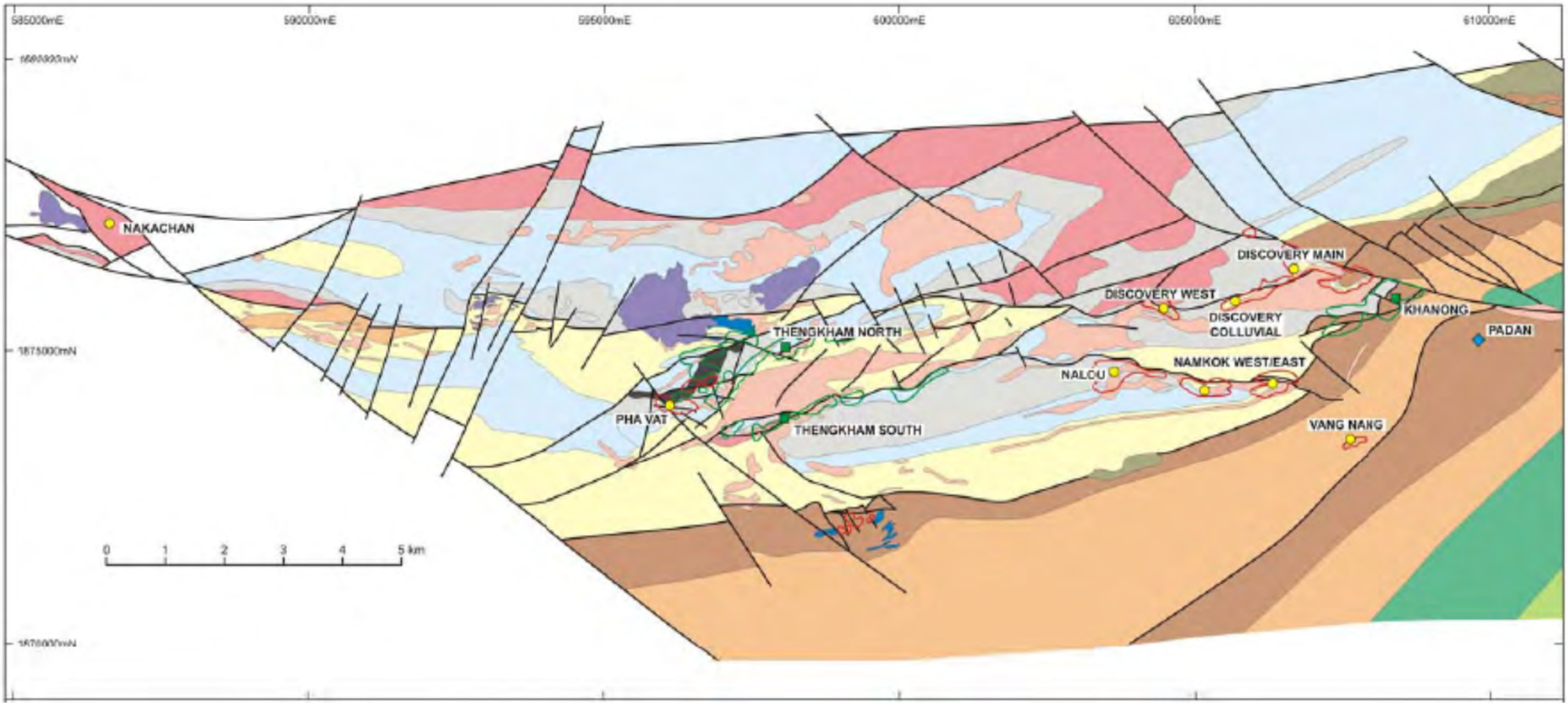
Stream sediment geochemistry

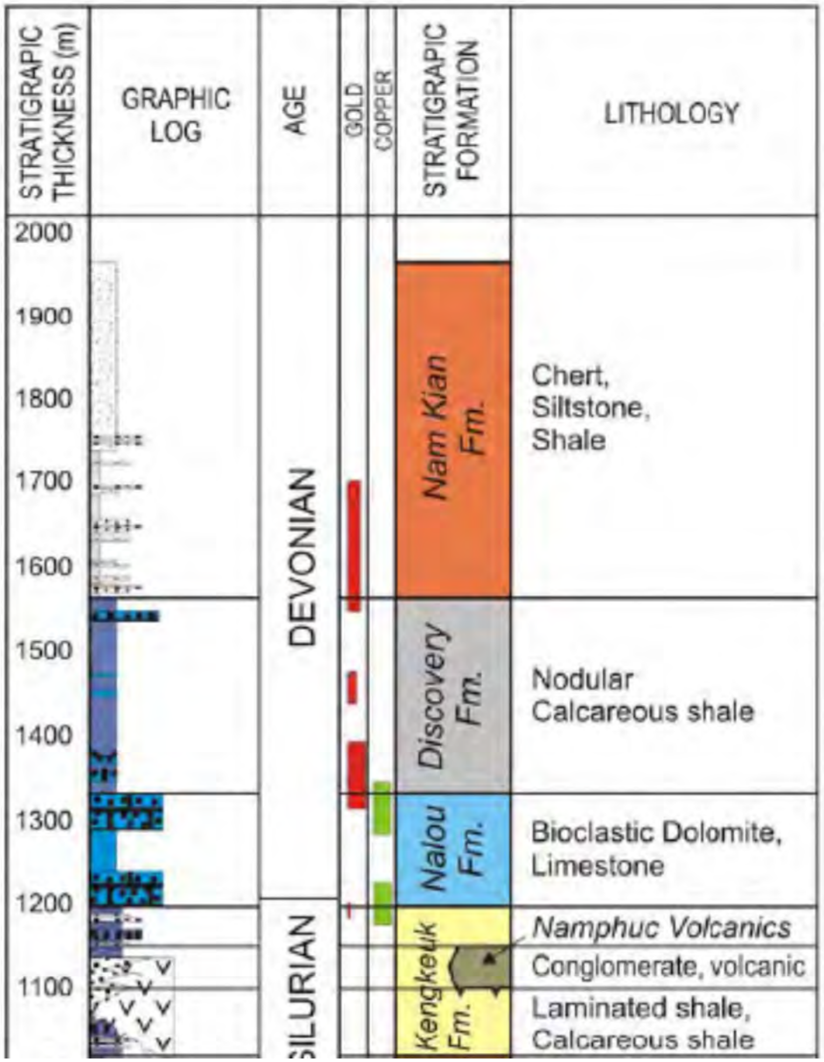


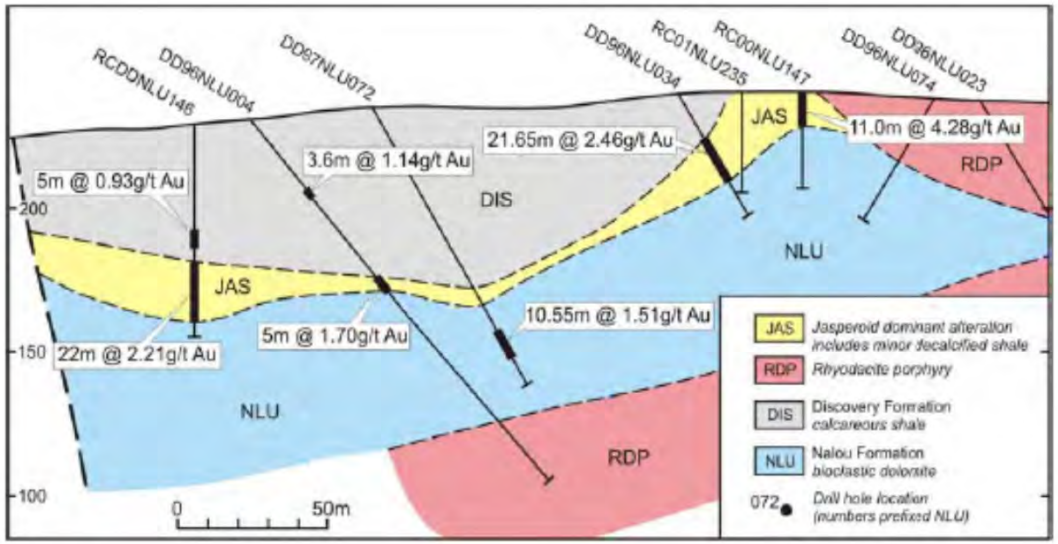
Gold in soil and auger geochemistry

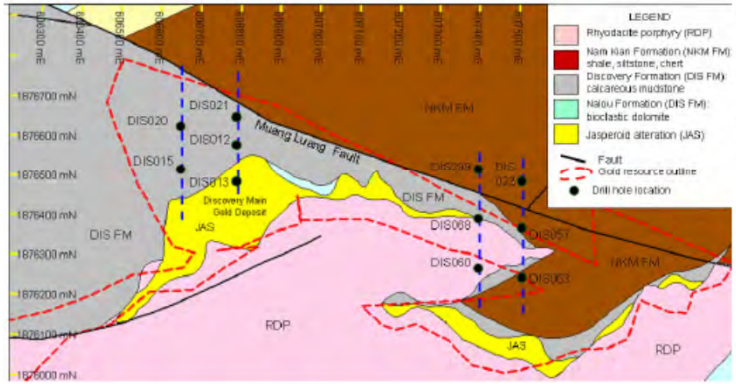


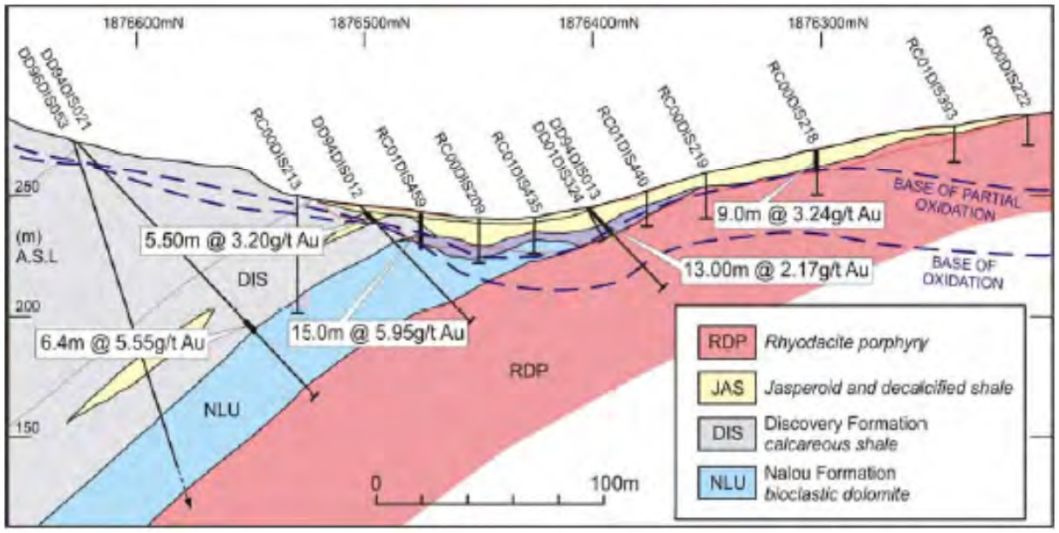
Gold in Jasperoid


585000mE
590000mE
595000mE
600000mE
605000mE
610000mE
1875000mN
NAKACHAN
DISCOVERY MAIN
DISCOVERY WEST
DISCOVERY COLLUVIAL
KHANONG
PADAN
THENGKHAM NORTH
NAMKOK WEST/EAST
NALOU
PHA VAT
THENGKHAM SOUTH
VANG NANG
0 1 2 3 4 5 km

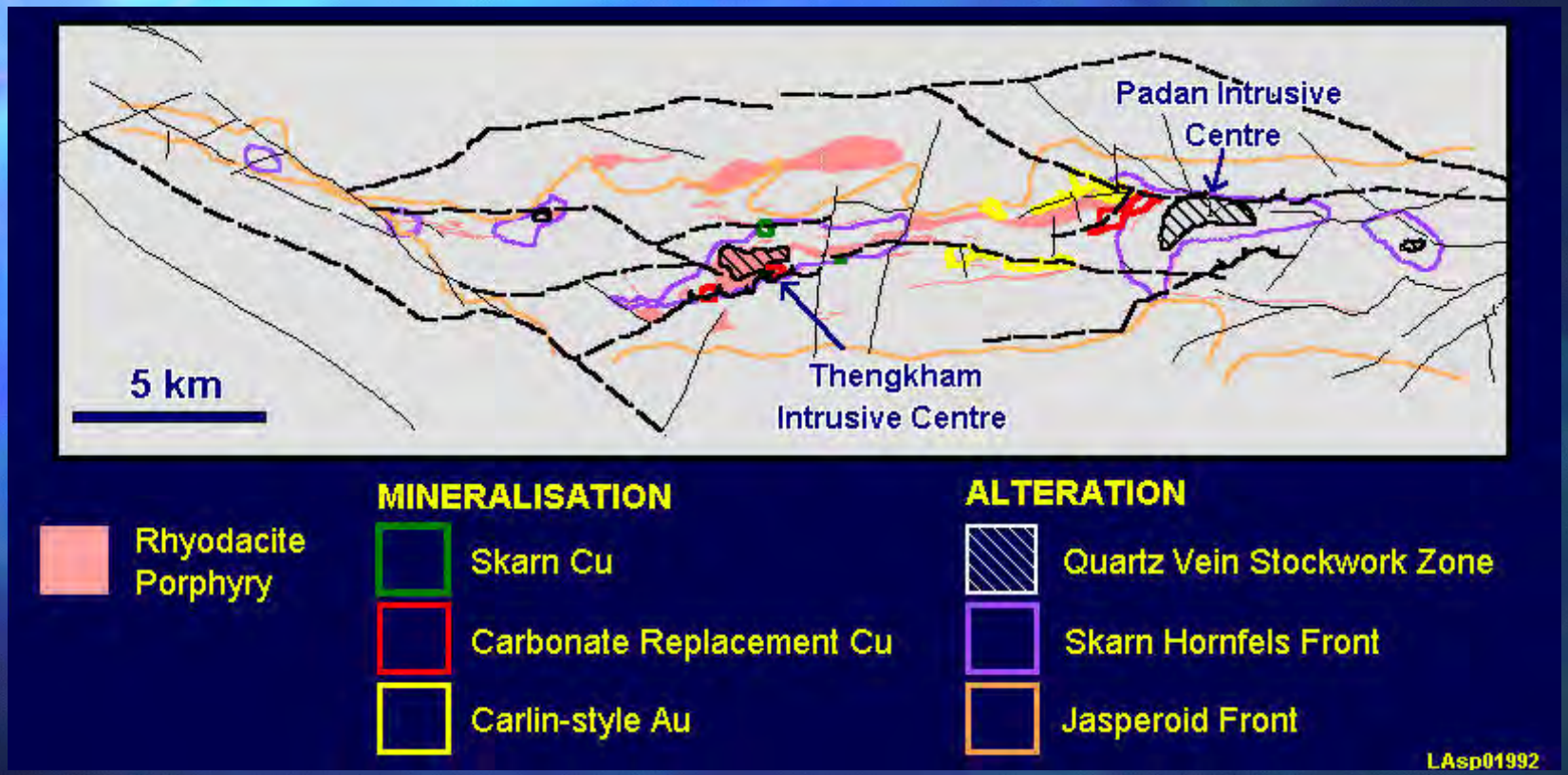

STRATIGRAPIC THICKNESS (m)
GRAPHIC LOG
AGE
GOLD
COPPER
STRATIGRAPIC FORMATION
LITHOLOGY
2000
1900
1800
1700
1600
1500
1400
1300
1200
1100
DEVONIAN
SILURIAN
Nam Kian Fm.
Chert, Siltstone, Shale
Discovery Fm.
Nodular Calcareous shale
Nalou Fm.
Bioclastic Dolomite, Limestone
Namphuc Volcanics
Kengkeuk Fm.
Conglomerate, volcanic
Laminated shale, Calcareous shale


RCDDNLU146
DD96NLU004
DD97NLU072
DD96NLU034
RC01NLU235
RC00NLU147
DD96NLU074
DD96NLU023
5m @ 0.93g/t Au
3.6m @ 1.14g/t Au
21.65m @ 2.46g/t Au
11.0m @ 4.28g/t Au
JAS
RDP
DIS
NLU
200
150
100
22m @ 2.21g/t Au
5m @ 1.70g/t Au
10.55m @ 1.51g/t Au
0
50m
JAS Jasperoid dominant alteration includes minor decalcified shale
RDP Rhyodacite porphyry
DIS Discovery Formation calcareous shale
NLU Nalou Formation bioclastic dolomite
072 Drill hole location (numbers prefixed NLU)

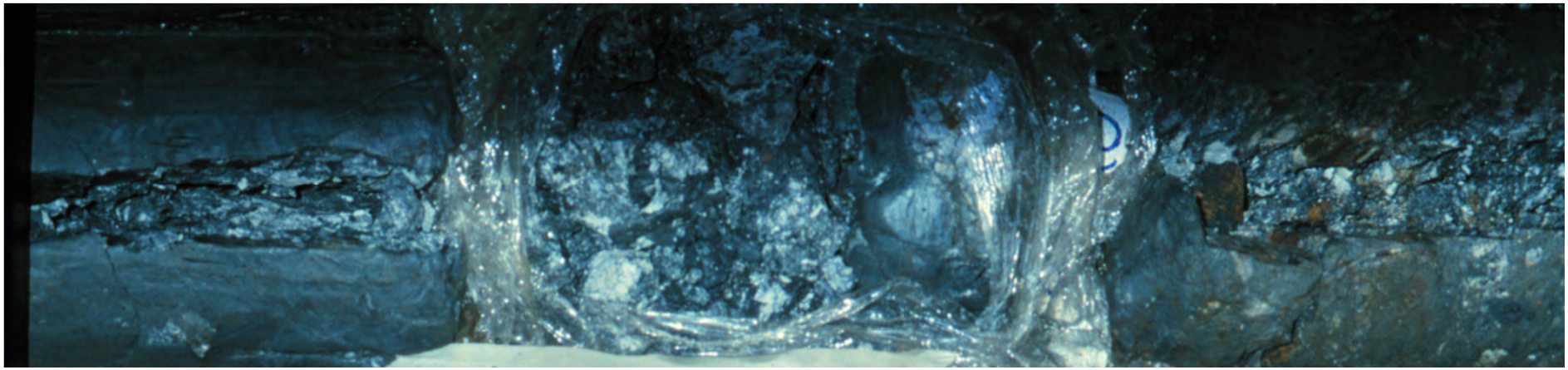

LEGEND
Rhyodacite porphyry (RDP)
Nam Han Formation (NKM FM): shale, siltstone, chert
Discovery Formation (DIS FM): calcareous mudstone
Nalou Formation (DIS FM): bioclastic dolomite
Jasperoid alteration (JAS)
Fault
Gold resource outline
Drill hole location
DIS020
DIS021
DIS012
DIS015
DIS013
Muang Luang Fault
Discovery Main Gold Deposit
JAS
DIS FM
NKM FM
DIS009
DIS060
DIS063
RDP


1876600mN
1876500mN
1876400mN
1876300mN
DD94DIS021
DD96DIS993
RC00DIS213
DD94DIS012
RC01DIS459
RC00DIS209
RC01DIS435
DD94DIS013
DD01DIS324
RC01DIS446
RC00DIS219
RC00DIS218
RC01DIS393
RC00DIS222
250
200
150
(m) A.S.L
5.50m @ 3.20g/t Au
9.0m @ 3.24g/t Au
13.00m @ 2.17g/t Au
BASE OF PARTIAL OXIDATION
BASE OF OXIDATION
DIS
6.4m @ 5.55g/t Au
15.0m @ 5.95g/t Au
RDP
NLU
0
100m
RDP Rhyodacite porphyry
JAS Jasperoid and decalcified shale
DIS Discovery Formation calcareous shale
NLU Nalou Formation bioclastic dolomite

Mineralisation and Alteration

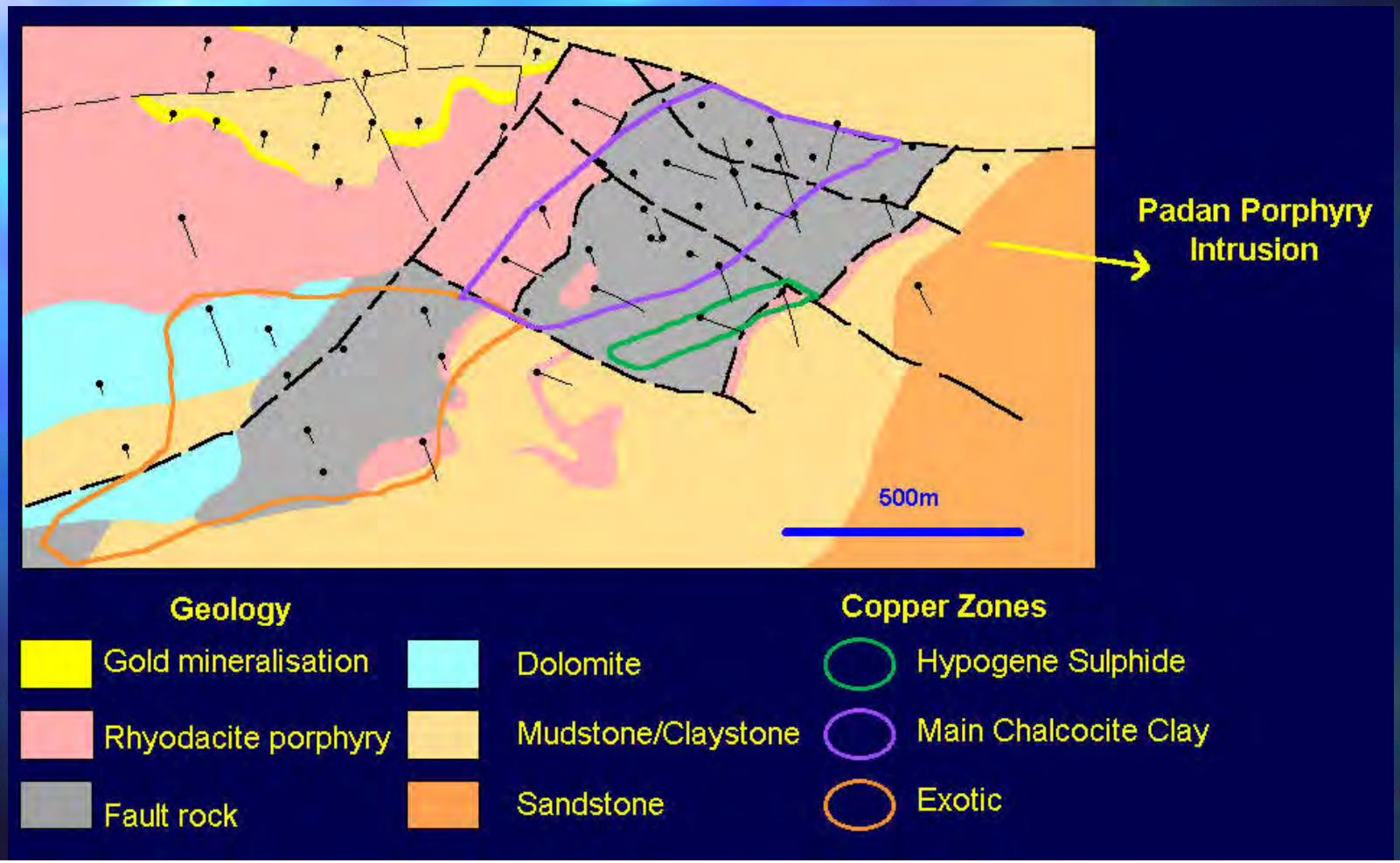


Discovering copper



Is this just a Fault zone?

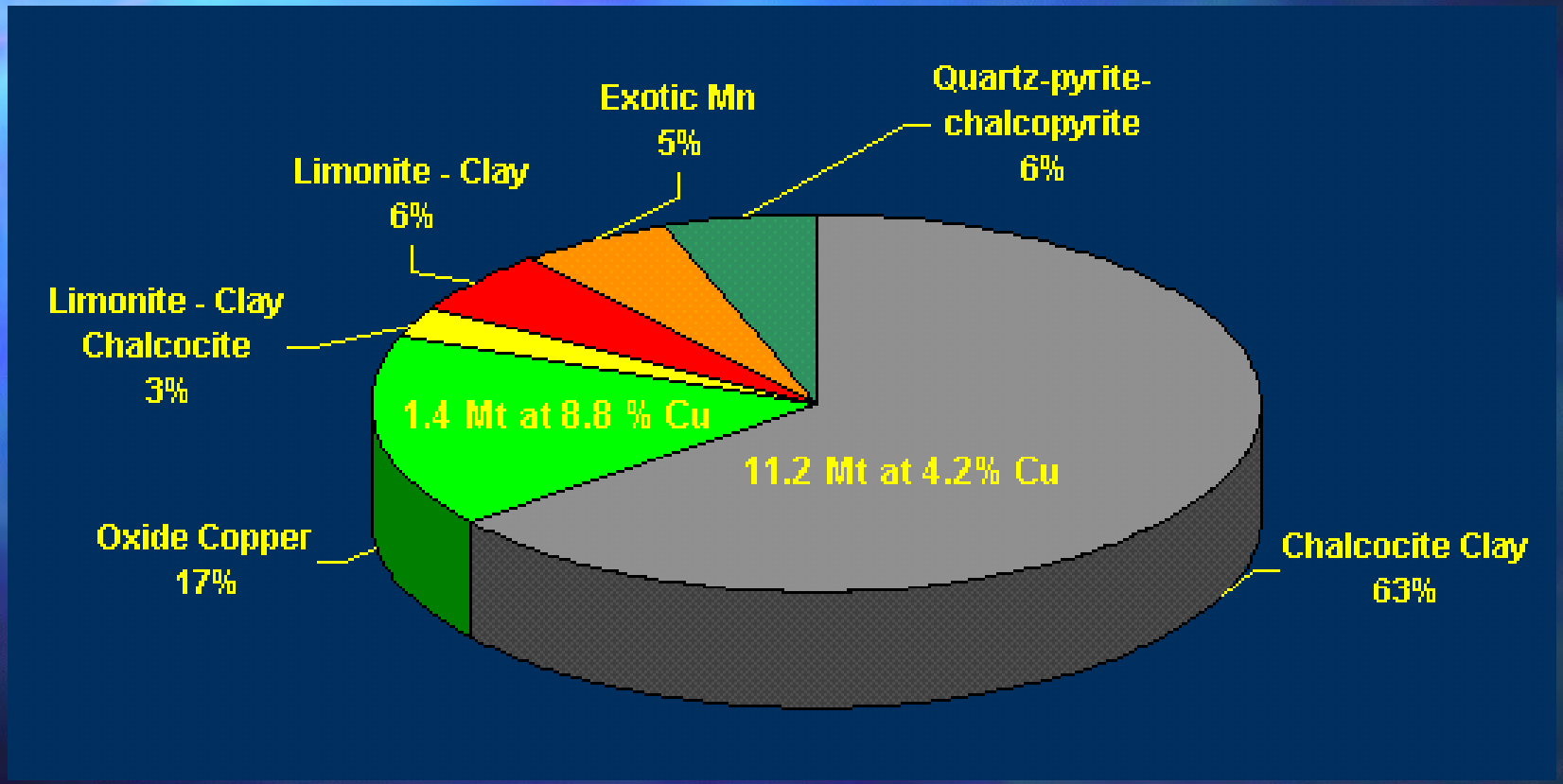
Khanong Geology



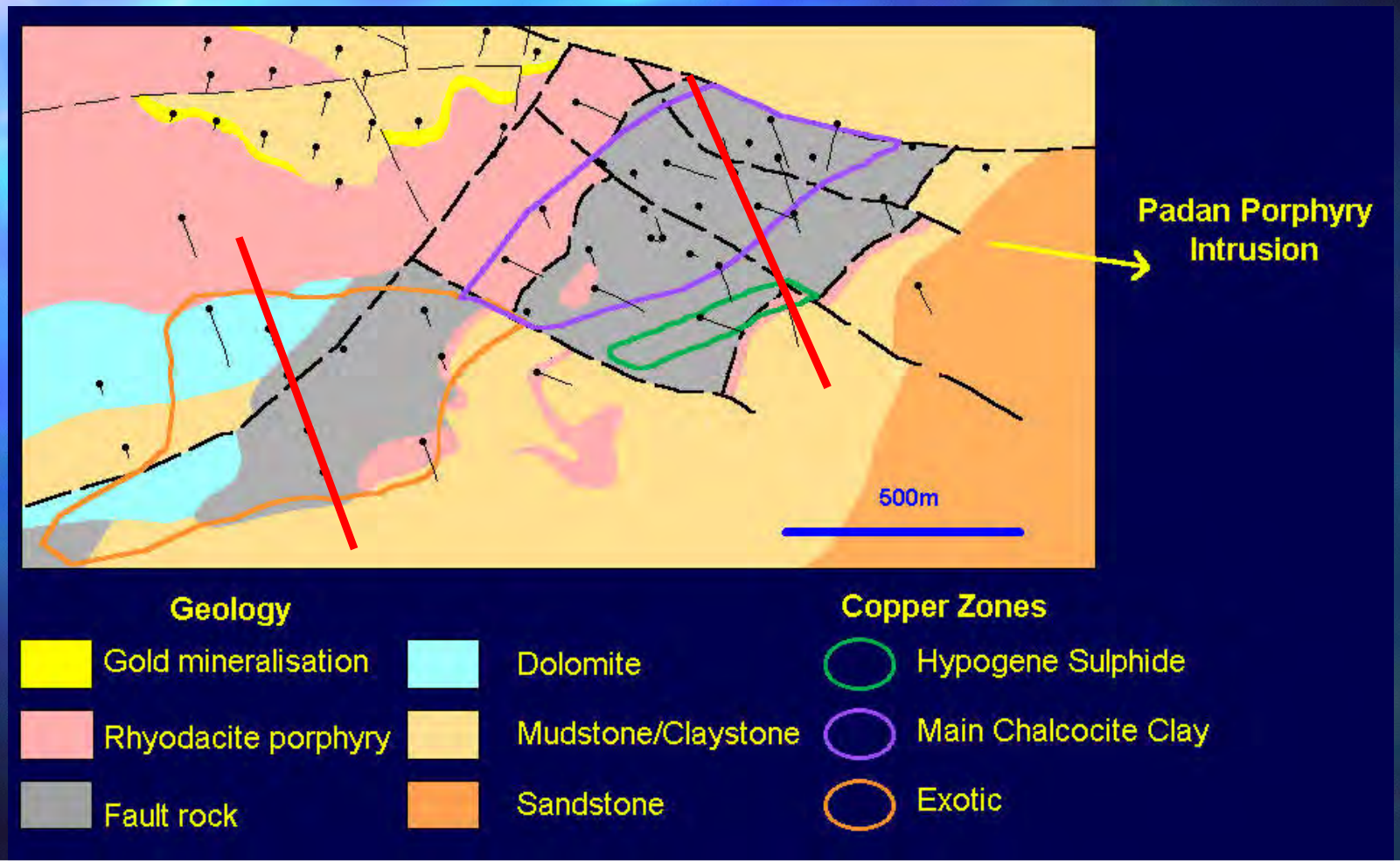
RIO TINTO

Khanong Cu Resource

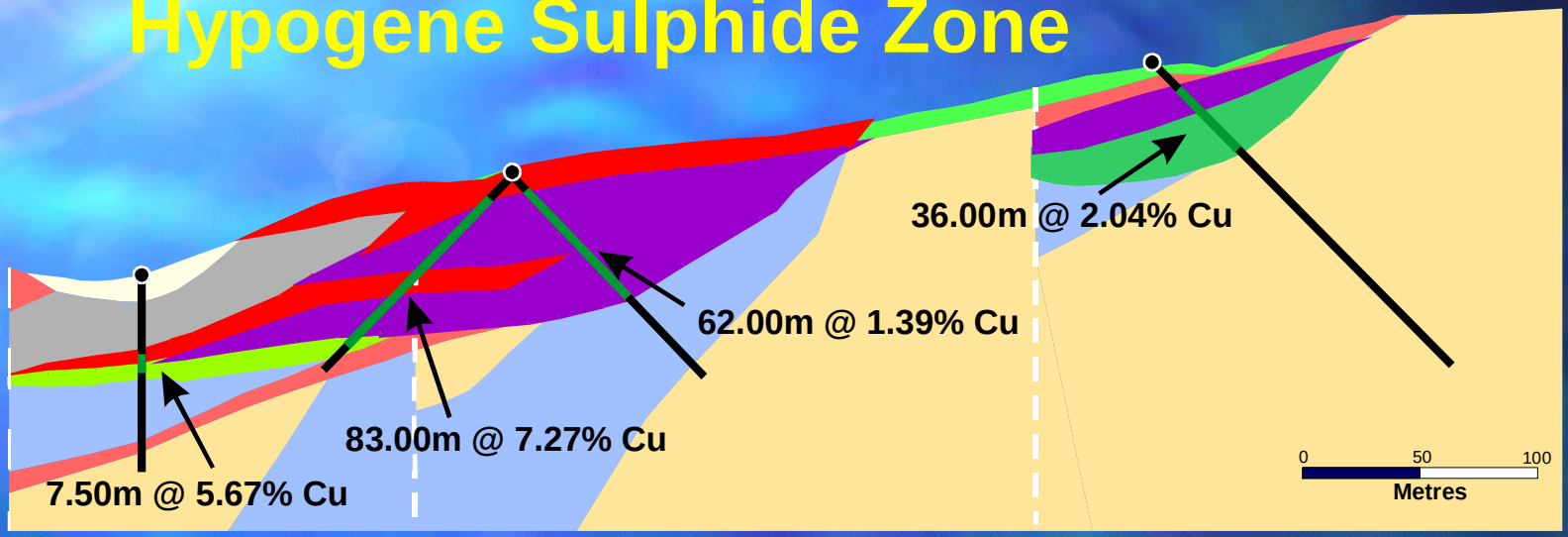
28.1 Mt at 2.6 % Cu = 730 kt Cu



Khanong Geology



Main Chalcocite - Clay Zone and Hypogene Sulphide Zone



Geology

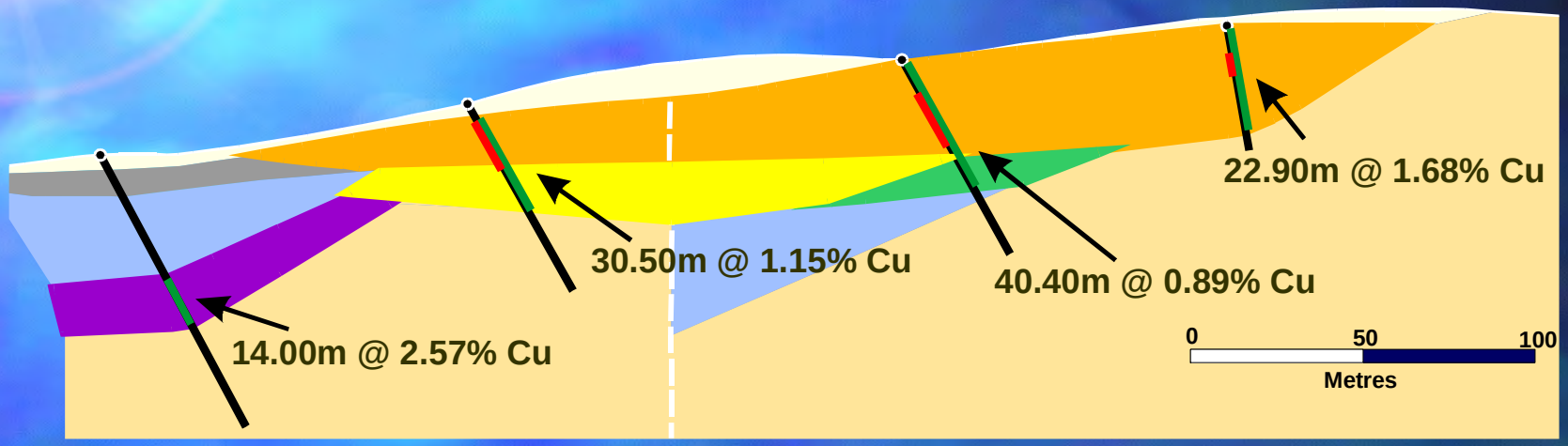
- Colluvium
- Ironstone
- Fault rock
- Rhyodacite porphyry
- Dolomite/limestone
- Claystone

Mineralisation Type

- Limonite - clay
- Limonite - clay and oxidised Cu minerals
- Chalcocite - clay
- Pyrite - quartz

LAsp01860

Exotic Zone



Geology

- Colluvium
- Fault rock
- Dolomite
- Claystone

Mineralisation Type

- Exotic Cu-Mn wad
- Limonite - clay and oxidised Cu minerals
- Partially oxidised chalcocite - clay
- Chalcocite - clay

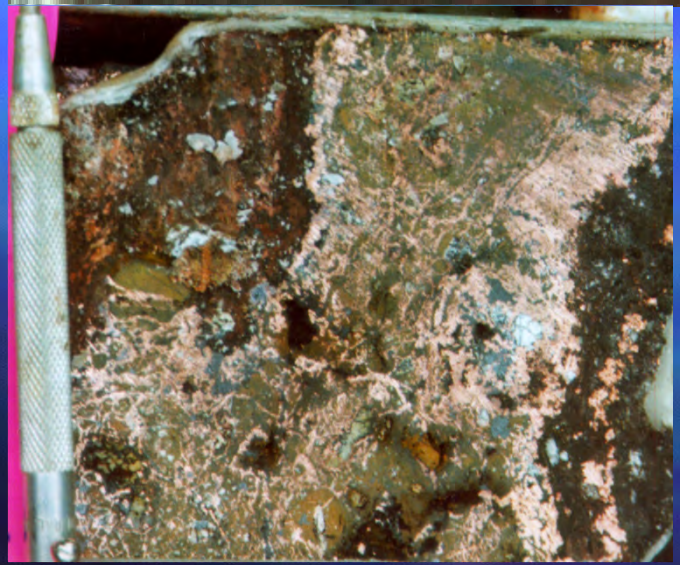
LAsp01859

Copper mineralisation

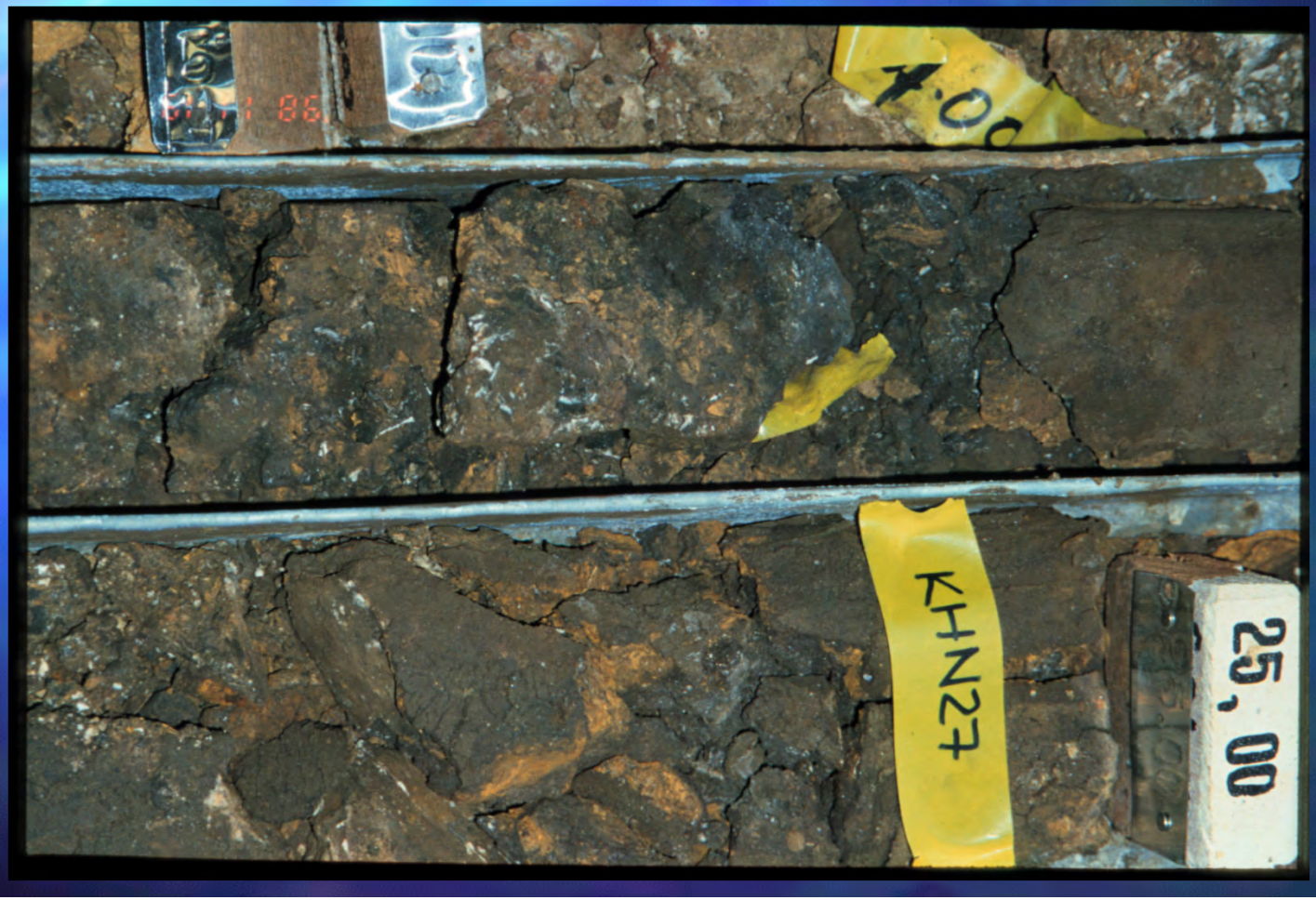
- Hypogene sulphide
  - Quartz-pyrite-chalcopyrite — 2.0 % Cu
- Supergene in-situ
  - Chalcocite clay — 4.9 % Cu
  - Partially oxidised chalcocite clay — 2.0 % Cu
  - Limonite-clay & oxidised Cu minerals — 8.8 % Cu
  - Limonite-clay — 0.6 % Cu
- Mobilised exotic
  - Cu-Mn-wad and Mn-oxide — 1.4 % Cu

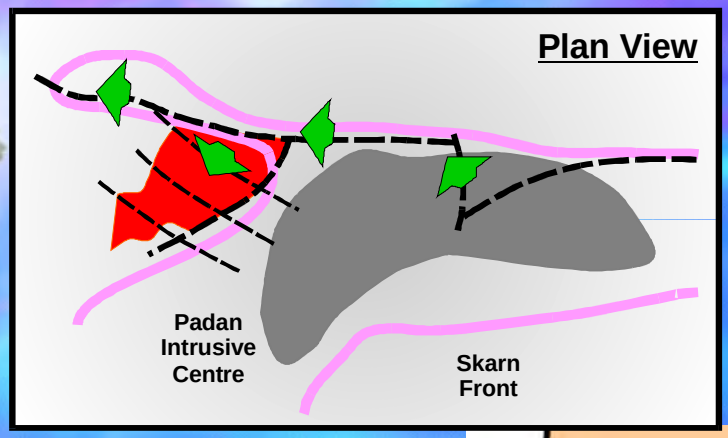
Chalcocite Clay

Limonite-clay & Cu oxides



Exotic Cu-Mn wad



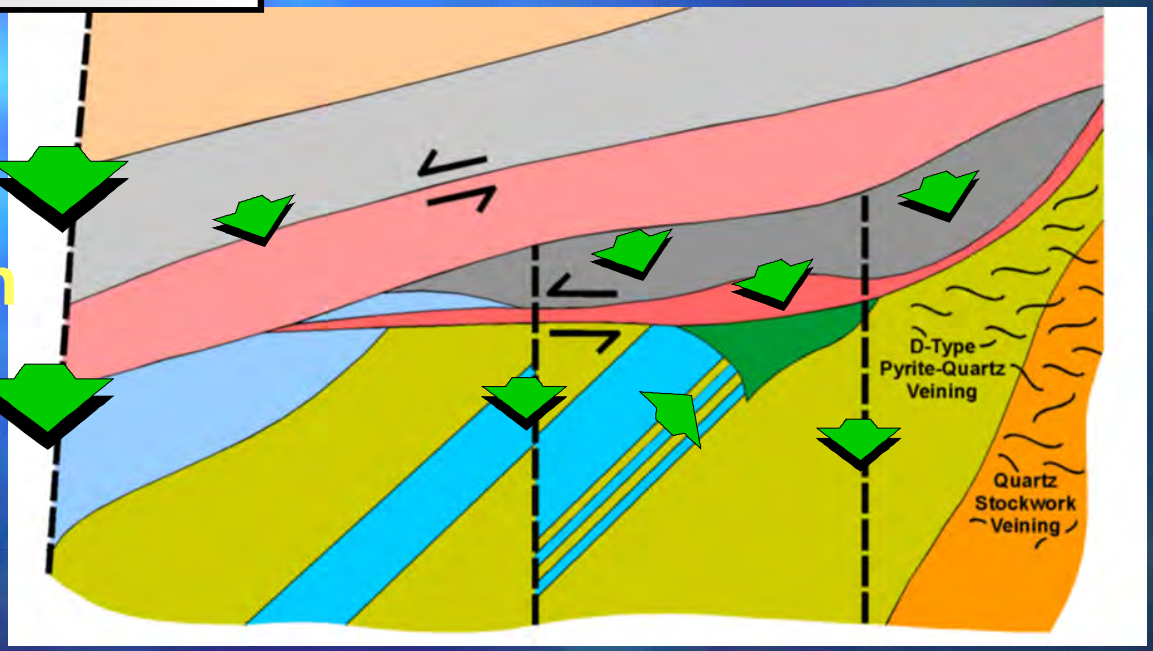


= Hydrothermal Fluids

Up to 4 km of Sediment

Hypogene Mineralisation

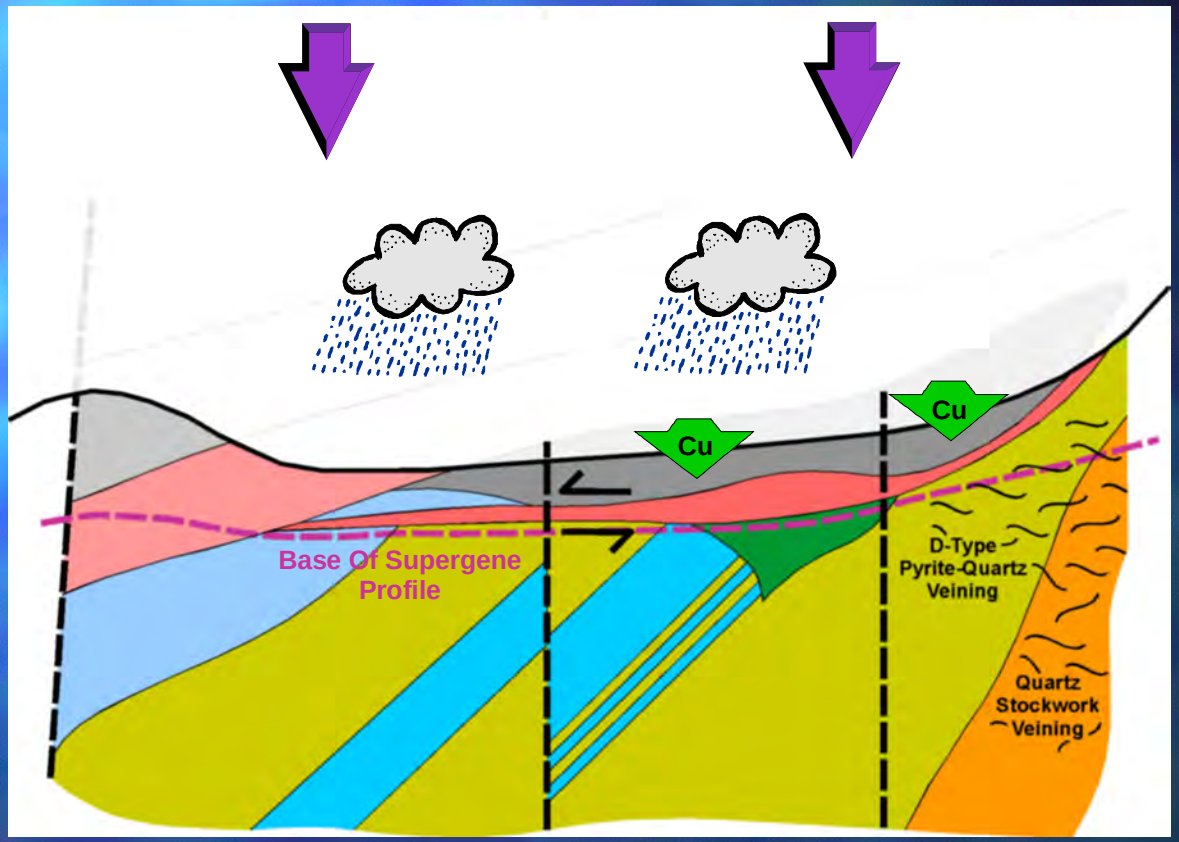
ca. 300 Ma



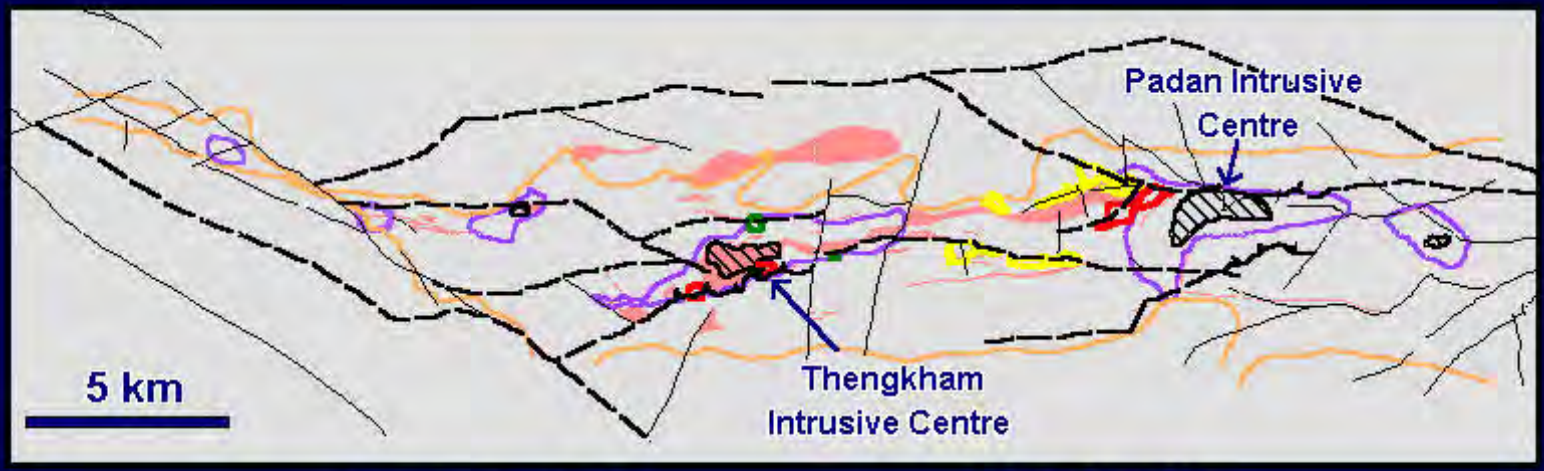
RIO TINTO

Supergene Weathering

Present Day



Zonation pattern



Rhyodacite Porphyry

MINERALISATION

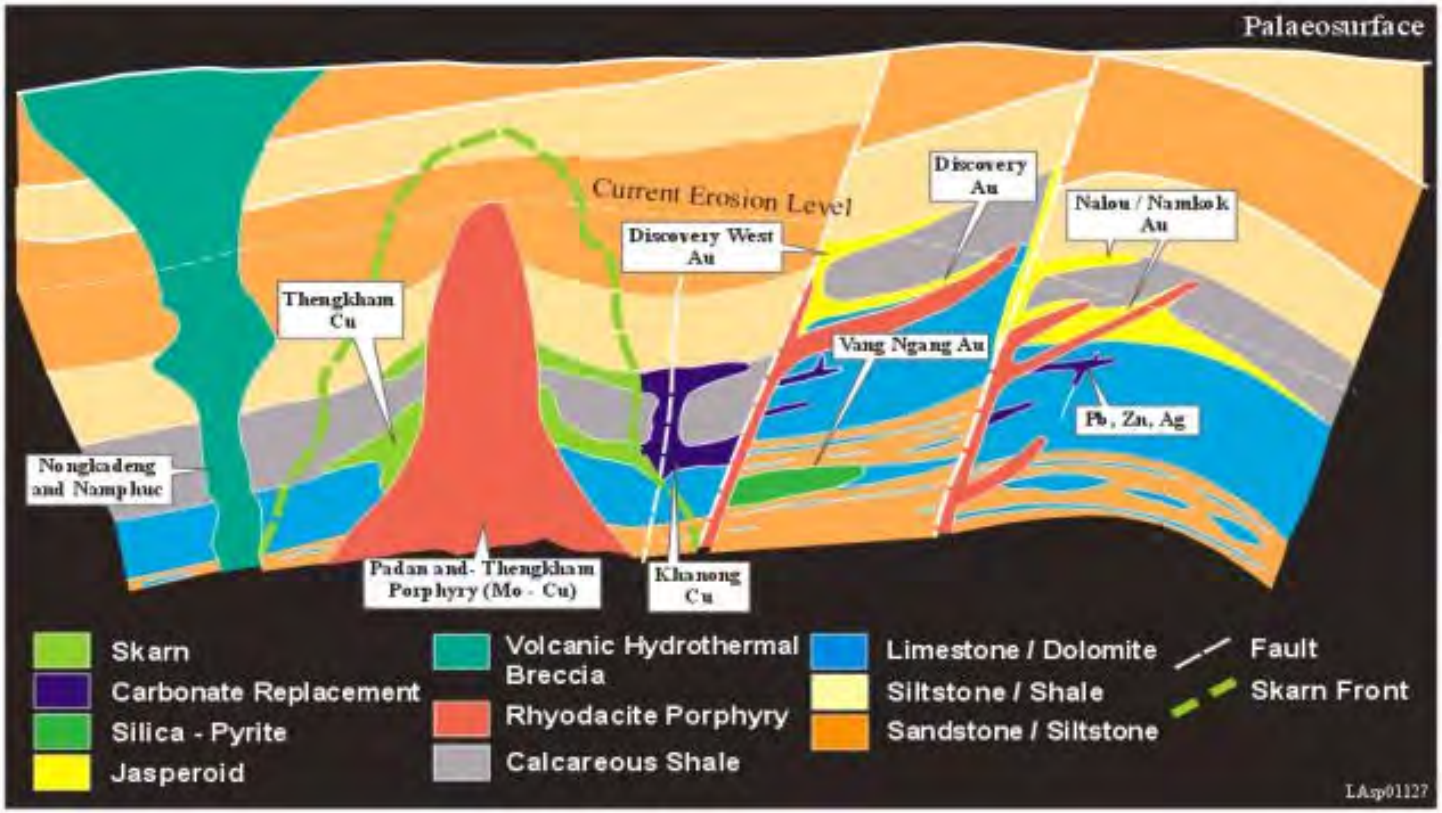
- Skarn Cu
- Carbonate Replacement Cu
- Carlin-style Au

ALTERATION

- Quartz Vein Stockwork Zone
- Skarn Hornfels Front
- Jasperoid Front

LAsp01992

Mineralisation Model



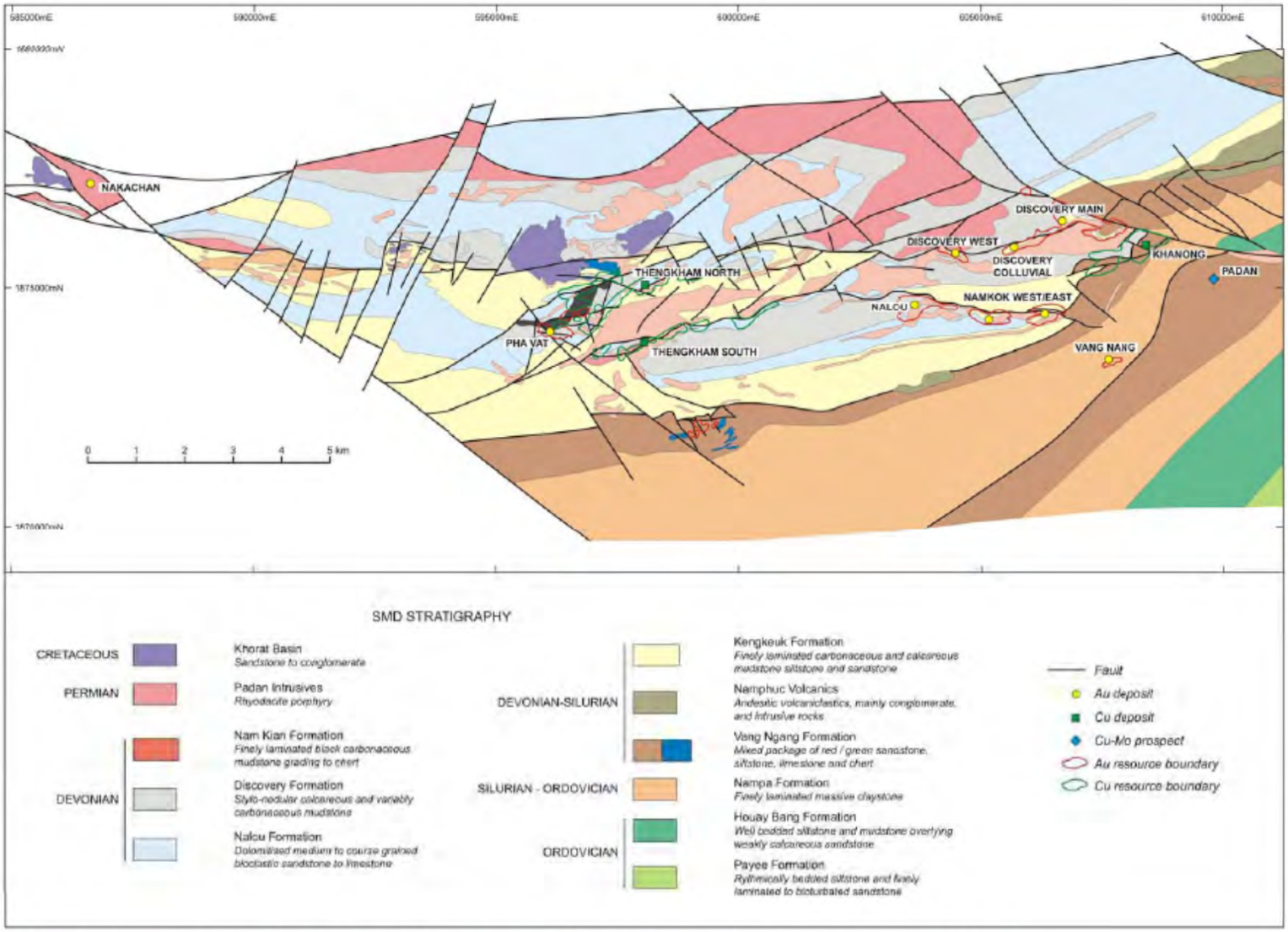
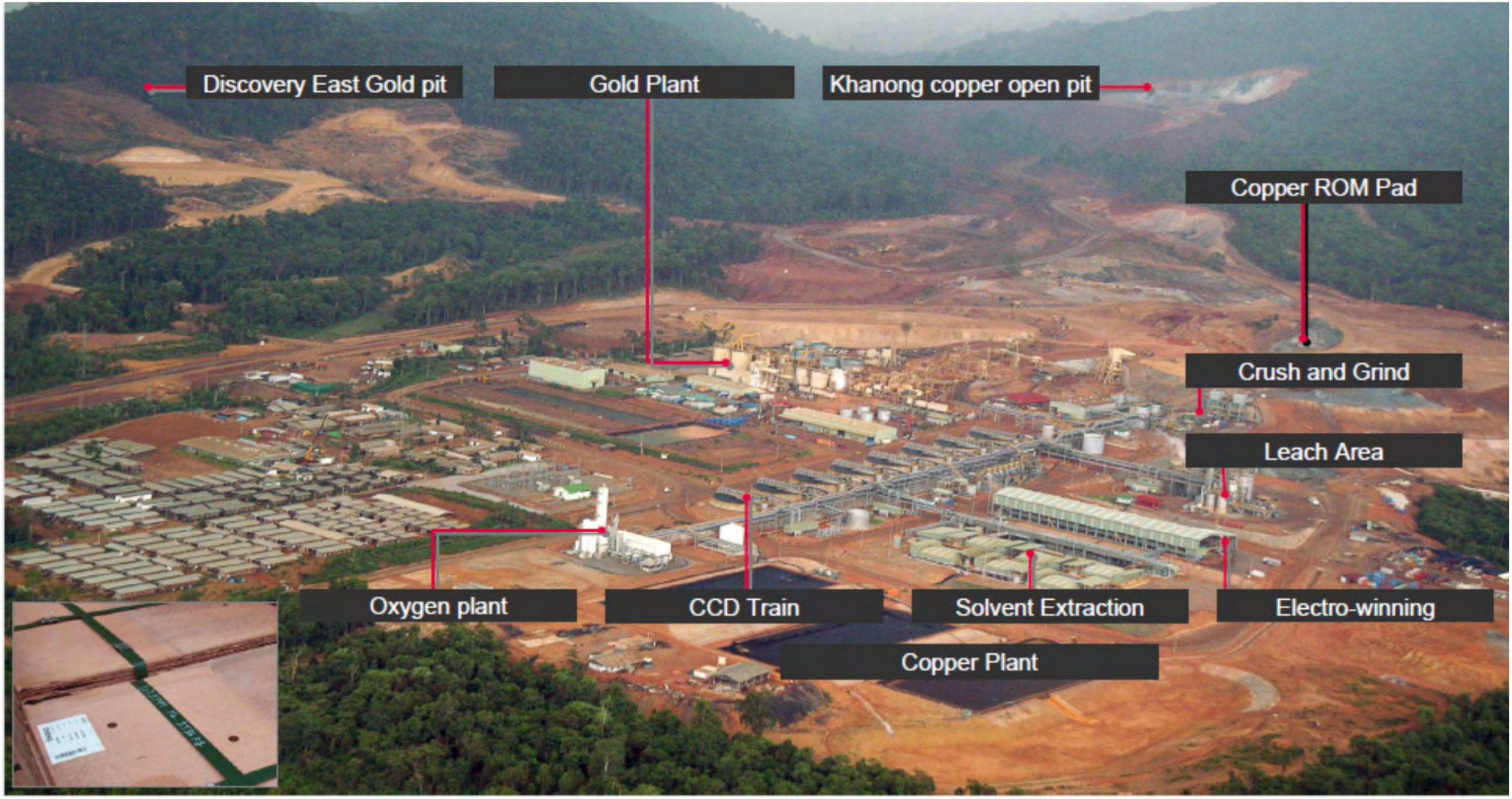


Fig. 4.1.1. District-scale geology map of the Sepon Mineral District (SMD) showing the location of the main gold and copper deposits (provided courtesy of OZ Minerals Limited).

Sepon in 2016


Discovery East Gold pit
Gold Plant
Khanong copper open pit
Copper ROM Pad
Crush and Grind
Leach Area
Oxygen plant
CCD Train
Solvent Extraction
Electro-winning
Copper Plant

1998

~2013