



Wealth Unearthed

Agenda

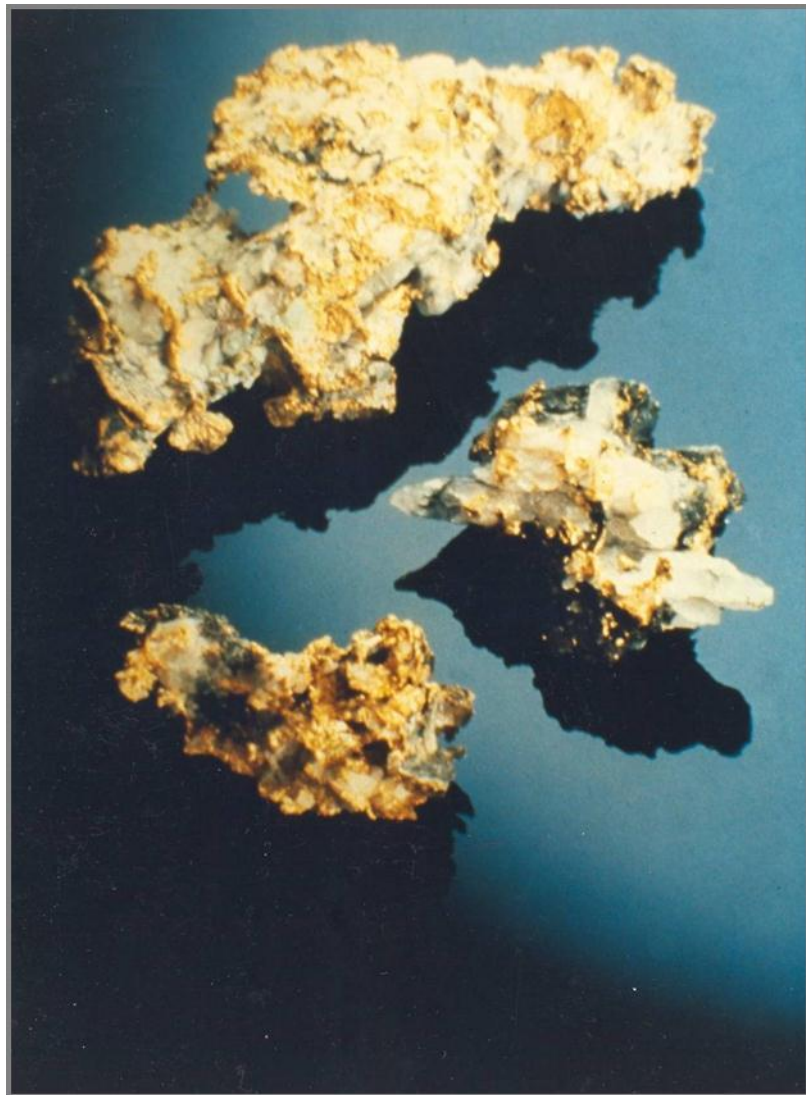
- ♥ Introduction - Gold
- ♥ What is ledging?
- ♥ Phases of getting a stope to full production
- ♥ What affects ledging quality?
- ♥ Blasting practices in ledging phases

Introduction - Gold

- ♥ The noblest of metals has been utilized by man for more than 5000 years
- ♥ First in artistic objects, jewelry and coins
- ♥ More recently playing a role in the worlds economies and the rapid development of computers



Introduction - Gold



- ♥ The cry “Gold” has lured man across oceans and continents, in search of this pale yellow metal
- ♥ Attracted by its value, weight, durable non-tarnishing luster and malleability, man has gone deep beneath the surface, to a hostile new environment

What is Ledging?

- ♥ Ledging is the first process of establishing the stope panels from the raise.
- ♥ The success of ledging operations are largely dependant on good drilling and blasting practices.
- ♥ This often determines whether the centre gully remains stable over its lifetime.
- ♥ May pose significant safety problems.

Phases of ledging

- ♥ Development of the crosscut to the reef position
- ♥ Development of the raise from the bottom to the top level on reef
- ♥ Development of the box holes from the crosscut to the raise concurrently with the raise development
- ♥ Establishing the advance strike gully positions and establishing the tipping point grizzlies
- ♥ Over-stoping of the crosscut
- ♥ Establishing the ledges and support
- ♥ Footwall lifting of gully floors
- ♥ Blasting of winch beds and travelling ways

What affects the quality of ledging?

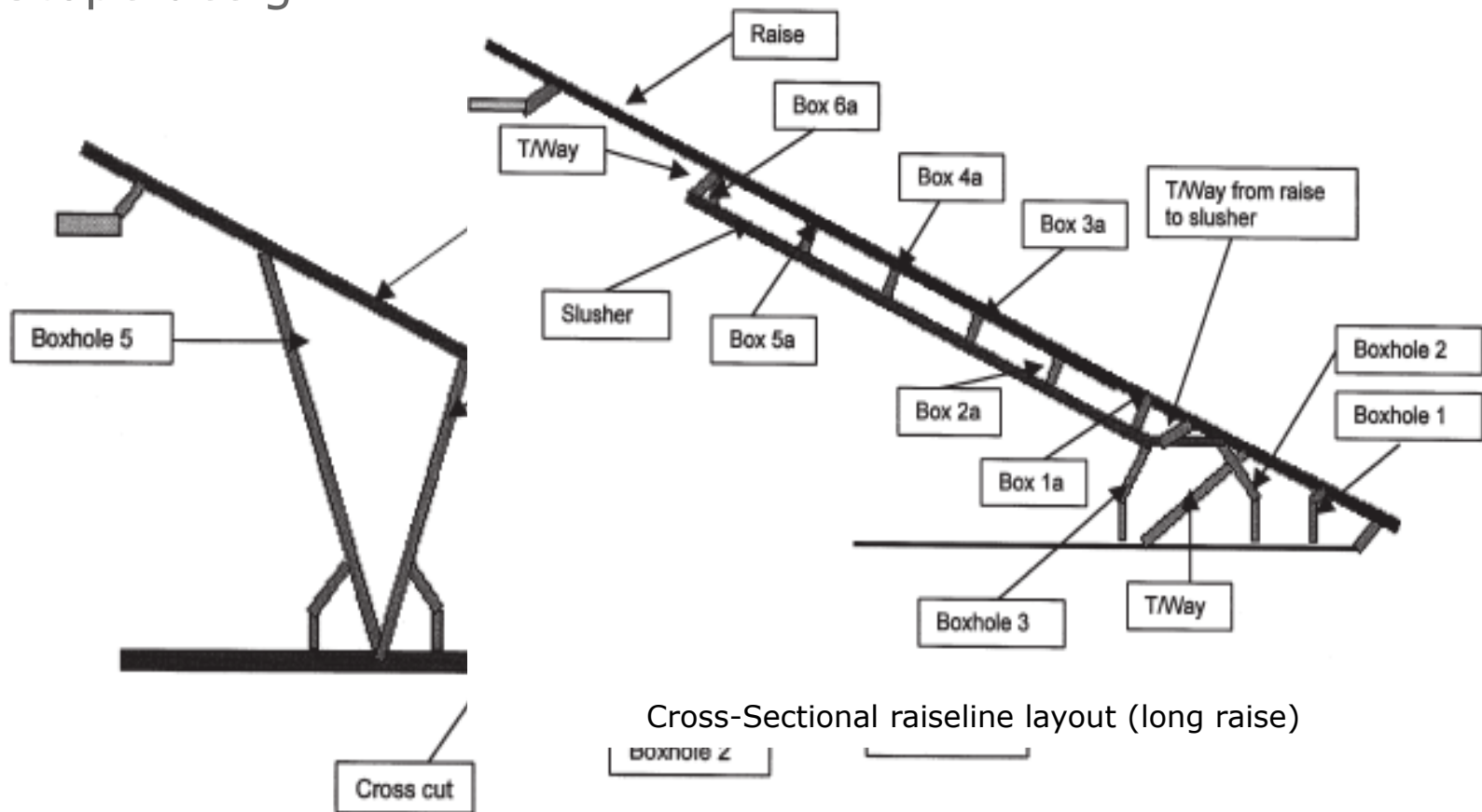
- ❖ Poor raise blasting practices
 - ❖ Off reef or reef not in correct position in the raise face
 - ❖ Raise not blasted to the correct dimensions
- ❖ Box holes not blasted and holed correctly
- ❖ Reef width and overlaying strata condition
- ❖ Poor marking, drilling and blasting practices
- ❖ Incorrect sequence of blasting panels from the raise
- ❖ Sub-standard support installation
- ❖ Highly stressed ground conditions due to geology or depth

Blasting practices

- Raise
- ASG
- Face
- Footwall lifting in winch beds and gullies

Raise

Stope design



Cross-sectional raiseline layout (Short raise)

Raise (5 rows, 3 columns)

Timing

27 Hole –
2.7m(H), 1.5m(W)

2.7m(H)

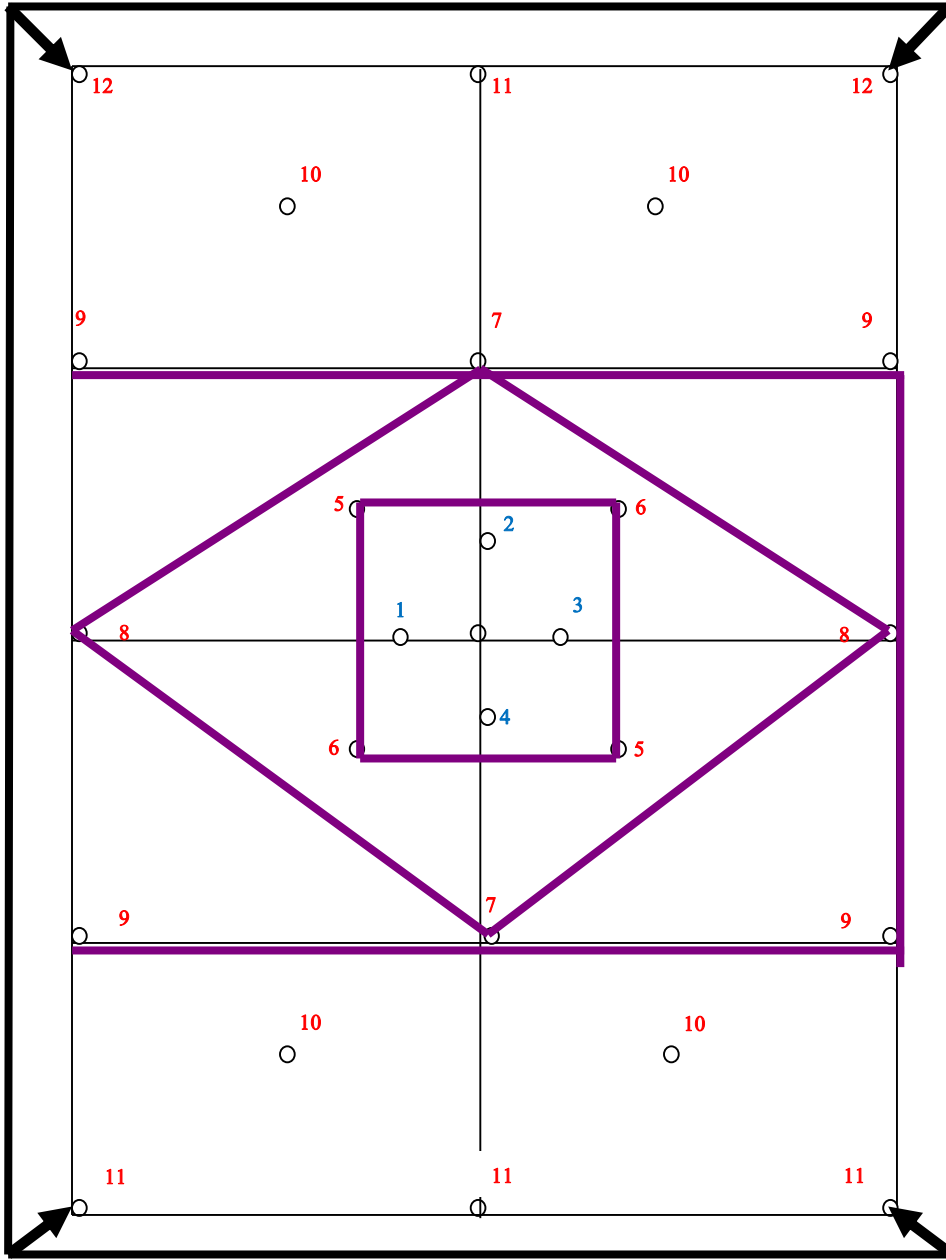
1.5m(W)

15cm

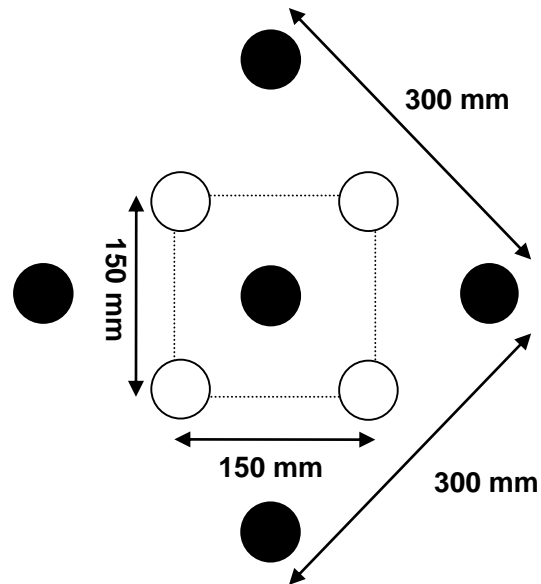
15cm

15cm

15cm



Five Hole Burn Cut Not recommended for rounds longer than 2.2m



 32 mm diameter charged hole

 32 mm diameter uncharged hole

Down dip ledging

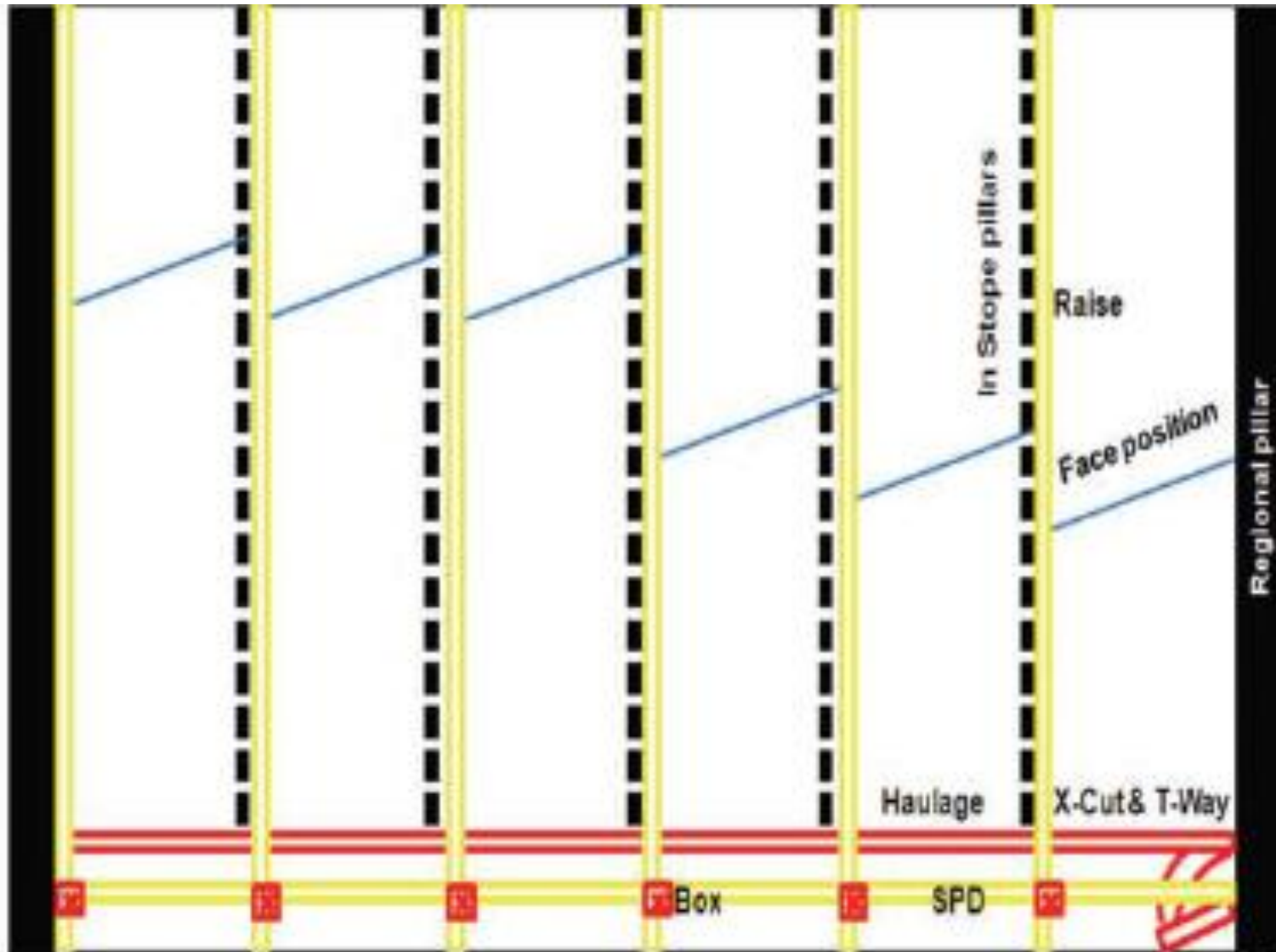
✔ Advantages

- ✔ Better control of sidewalls in the raise
- ✔ Support installed each day as the panel advances
- ✔ Winch remains in one place
- ✔ Back areas remain clean
- ✔ Equipping can commence while the ledge advances
- ✔ Easier control of ventilation

✔ Disadvantages

- ✔ No gullies established, requires footwall lifting which is time consuming and if not properly done can destabilise support
- ✔ Takes longer than breast ledging

Ledging overview – Down-Dip



Breast Ledging

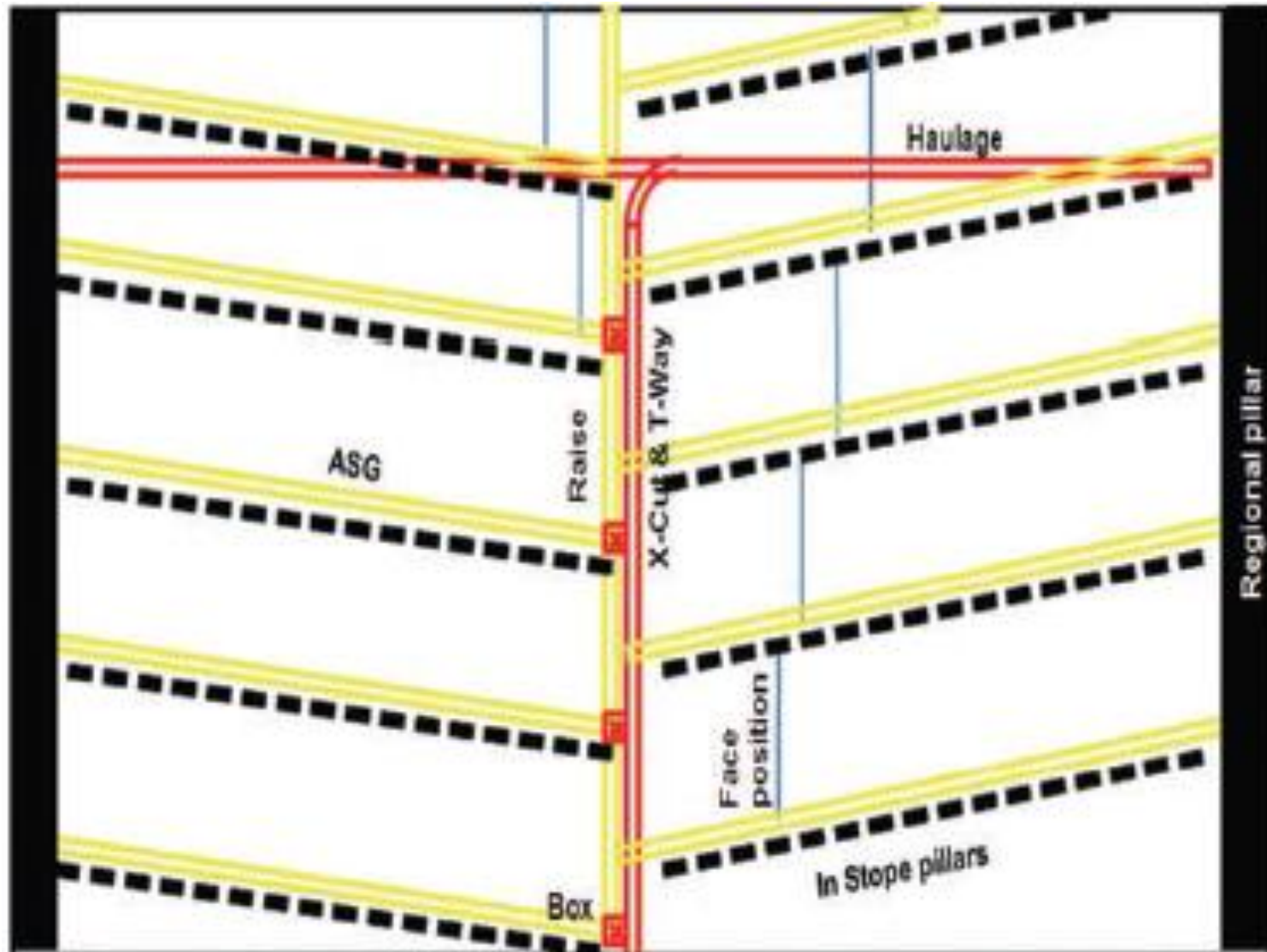
♥ Advantages

- ♥ Increased centares per blast
- ♥ Several panels can be ledged simultaneously
- ♥ Gullies immediately established

♥ Disadvantages

- ♥ Sidewall damage to the raise more eminent
- ♥ Face winch required for every face
- ♥ Support requirements may prevent blasting due to panel length
- ♥ Equipping difficult due to panels mined along raise

Ledging overview - Breast

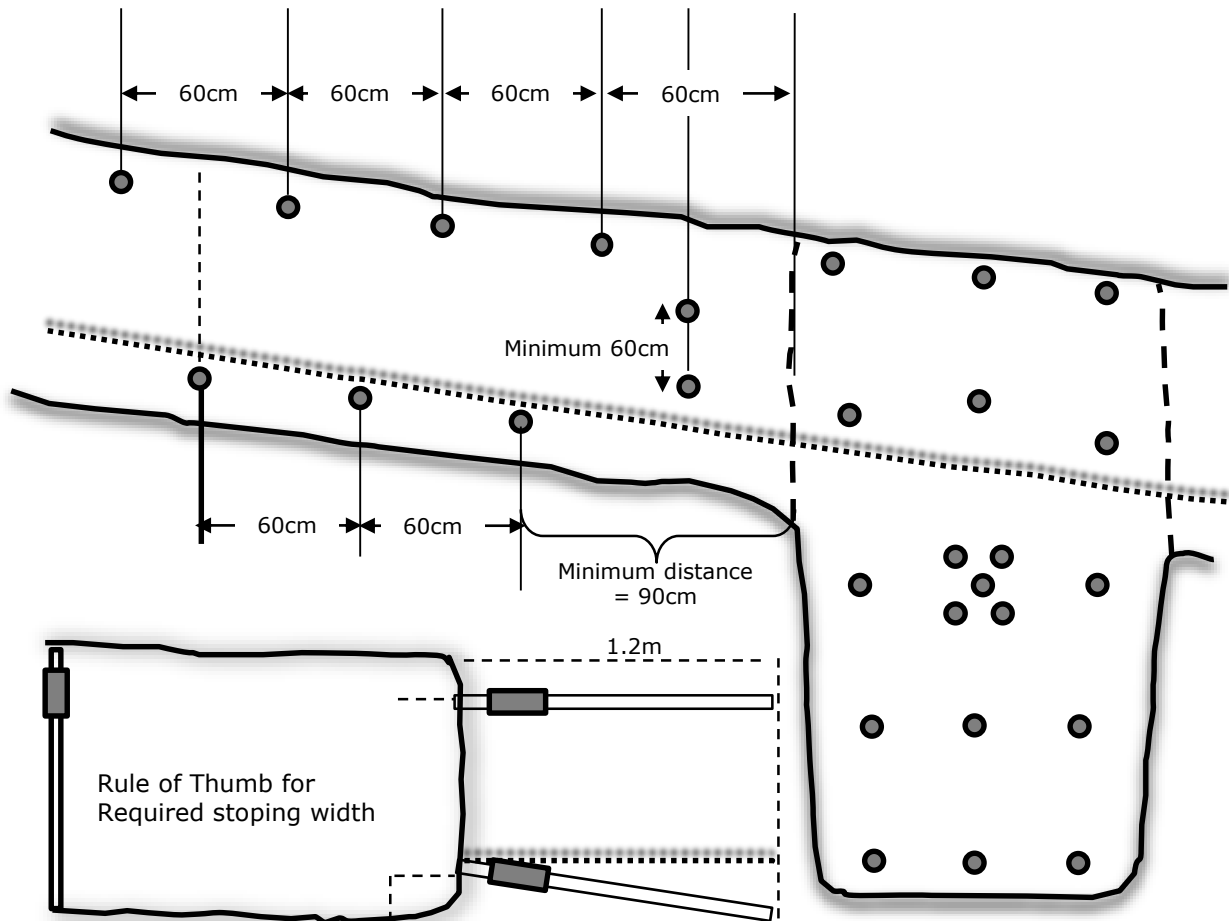


Advanced Strike Gully (ASG)

- ♥ Marking
- ♥ Drilling
- ♥ Charging
- ♥ Timing
- ♥ Support

ASG drilling with face to preserve the gully shoulder

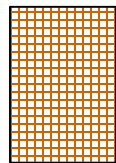
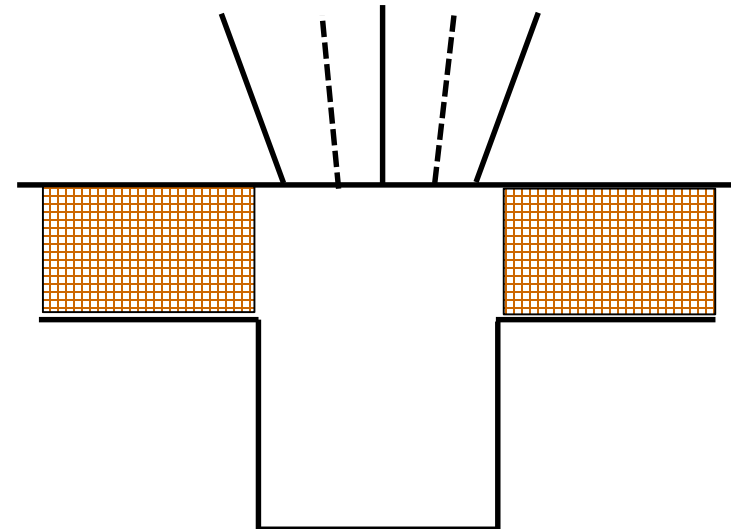
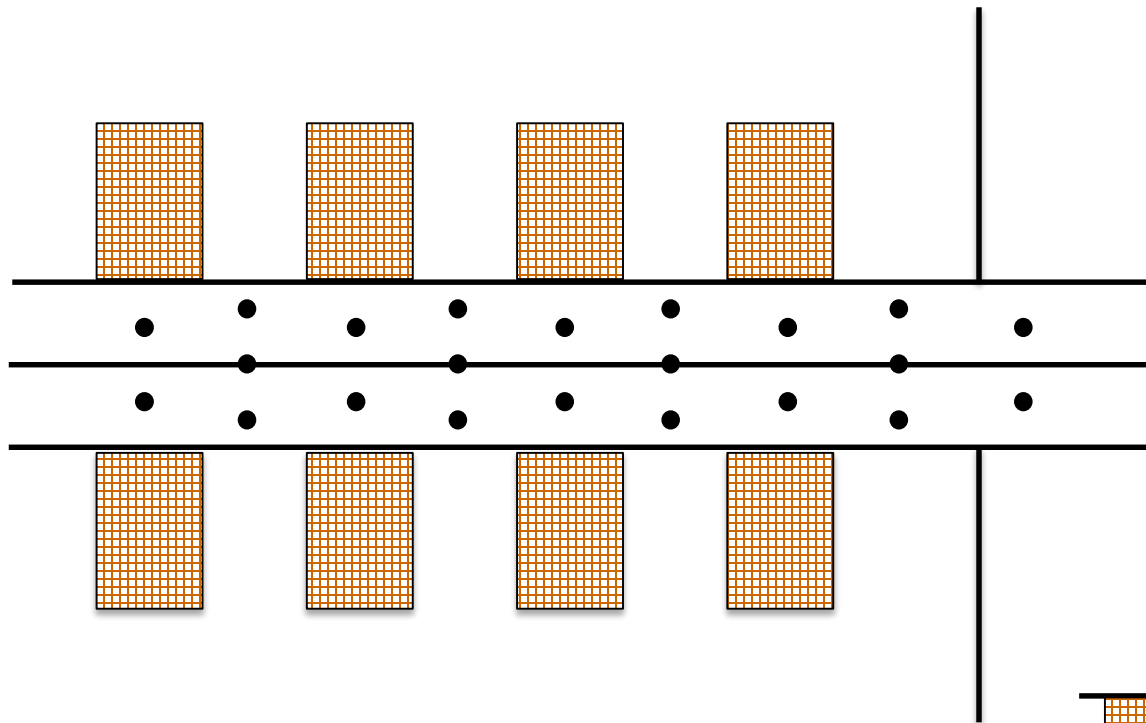
STOPING BEST PRACTICE



Importance of gully shoulder



ASG Support



Timber pack

● Grouted steel support

Shock Tube Products

Shock Tube Product Derivatives



Uni-Delay LP (6)
Shock Tube



Uni-Delay LP (3)
Shock Tube



Splitter
Shock Tube



Multi SPD
Shock Tube



Multi LPD
Shock Tube



Uni-Delay SP
Shock Tube



Trunkline
Shock Tube



Cluster
Shock Tube



Lead-In
Shock Tube



Extender
Shock Tube

Explosives Products



Explosives considerations

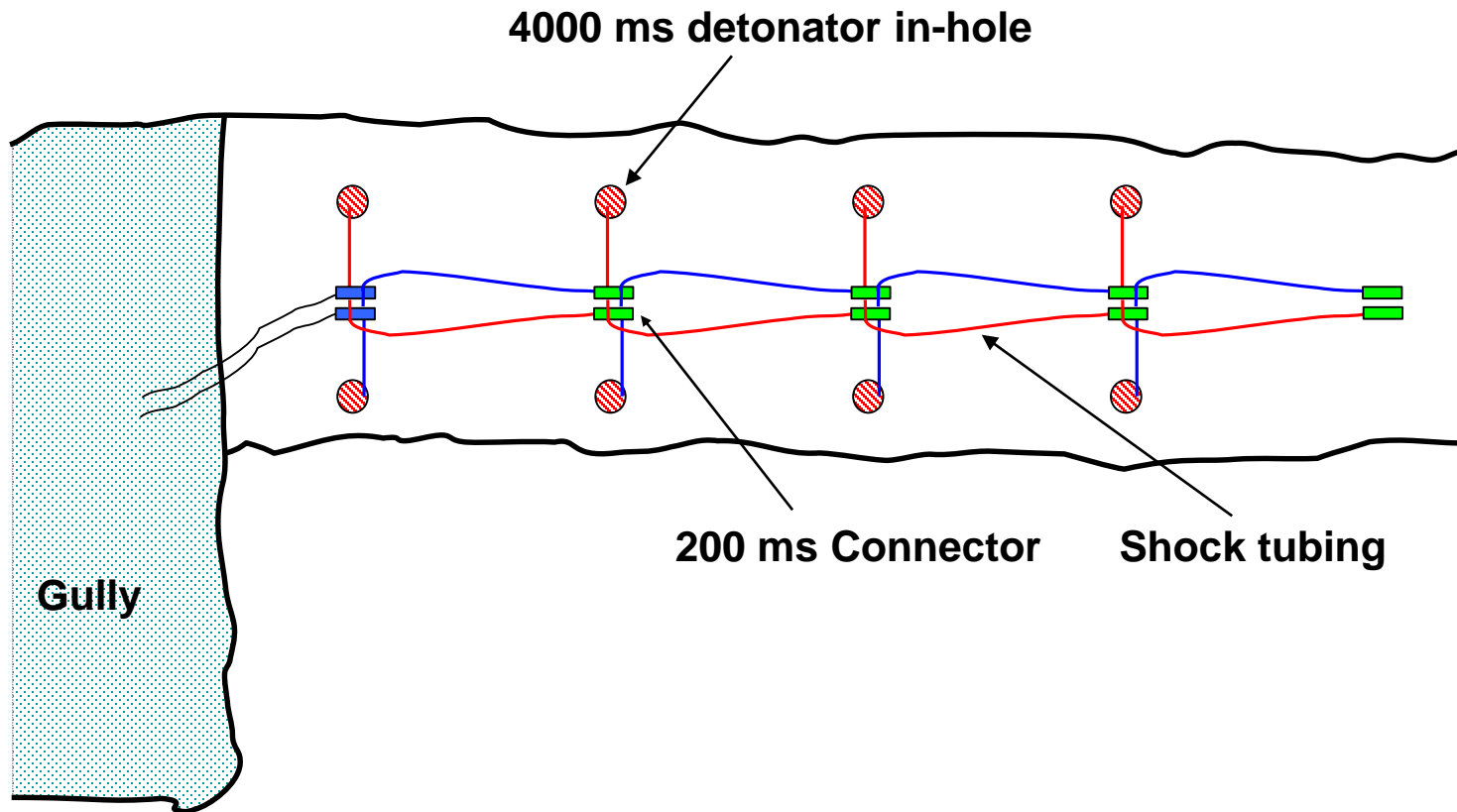
- ❖ ANFO is well known for its “gassy” nature and is not at all suitable for weak rocks due to the overbreak damage it causes.
- ❖ An emulsion product almost always results in less overbreak and should be selected for when starting the ledging process.
- ❖ A packaged product also has the advantage that the mass of explosive charged per hole is much easier to control and overcharging (leading to more overbreak) is less likely to occur.



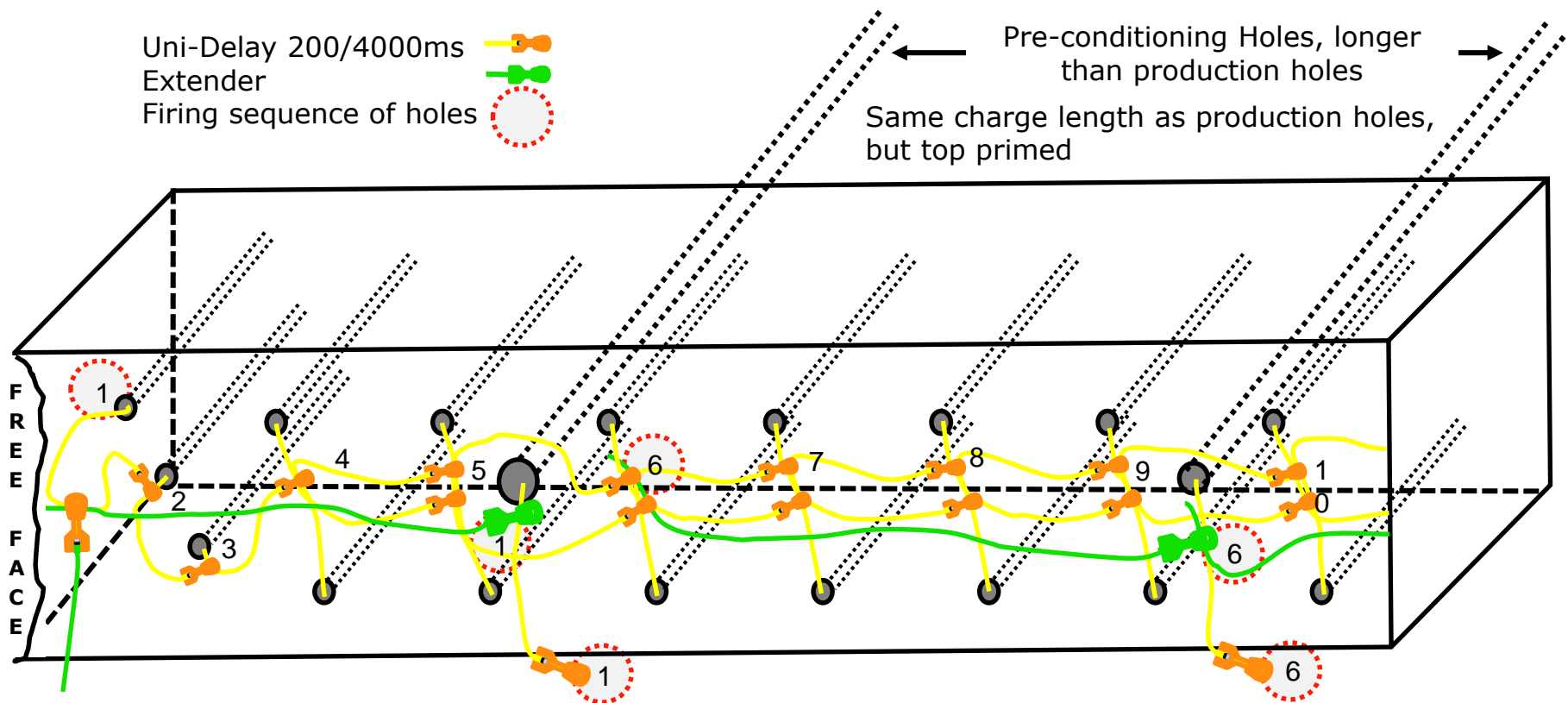
Charging a ledge panel

- The explosive energy placed next to the hangingwall can be controlled by using fewer cartridges/less explosives in the top holes.
- Using (say) three cartridges in the top holes and four in the bottom holes can significantly reduce damage to the hangingwall providing the bottom holes are timed to detonate first.

Recommended method of connecting a ledge panel



Pre-conditioning





Mining Services

Thank You