Implats – Impala Rustenburg operations

# USING ILLUMINATION AS A COMMUNICATION TOOL

## IN-STOPE LIGHTS – THE NEXT STEP

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# In-stope lights – the next step

- In-stope lights as a topic has already been presented at this forum and is not repeated in this presentation
- We identified an opportunity associated with in-stope lights that is not related to improved illumination

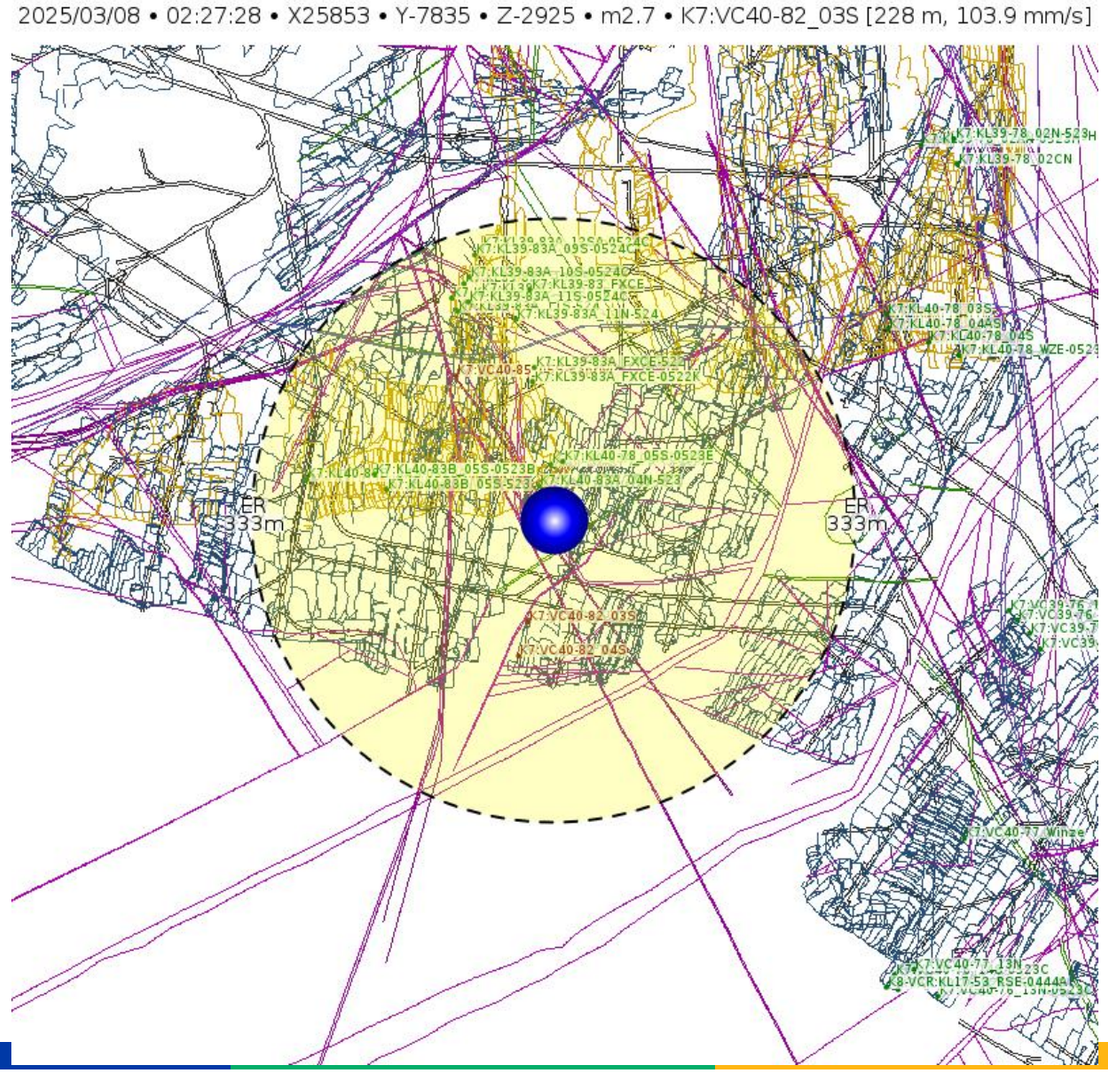
Topics to be covered:

- Seismic event withdrawal
  - PPV threshold
  - Withdrawal radius
- Communication constraints

- Circle back to in-stope lights

# Seismic event withdrawal

When a large seismic event is recorded, the seismic event is processed and as soon as the event location is reported, the event location is shown on screens located in control rooms and other offices, as well as WhatsApp and e-mail. The location is shown with a yellow withdrawal radius indicating where high PPV associated with the event occurred. All active workingplaces inside the withdrawal radius are identified and the crews instructed to withdraw from the reef horizon




Further explore words/phrases

- Large seismic event
- PPV
- Magnitude-PPV-distance relationship
- Processed
- Screens
- Withdrawal radius
- Instruction to withdraw (communication)



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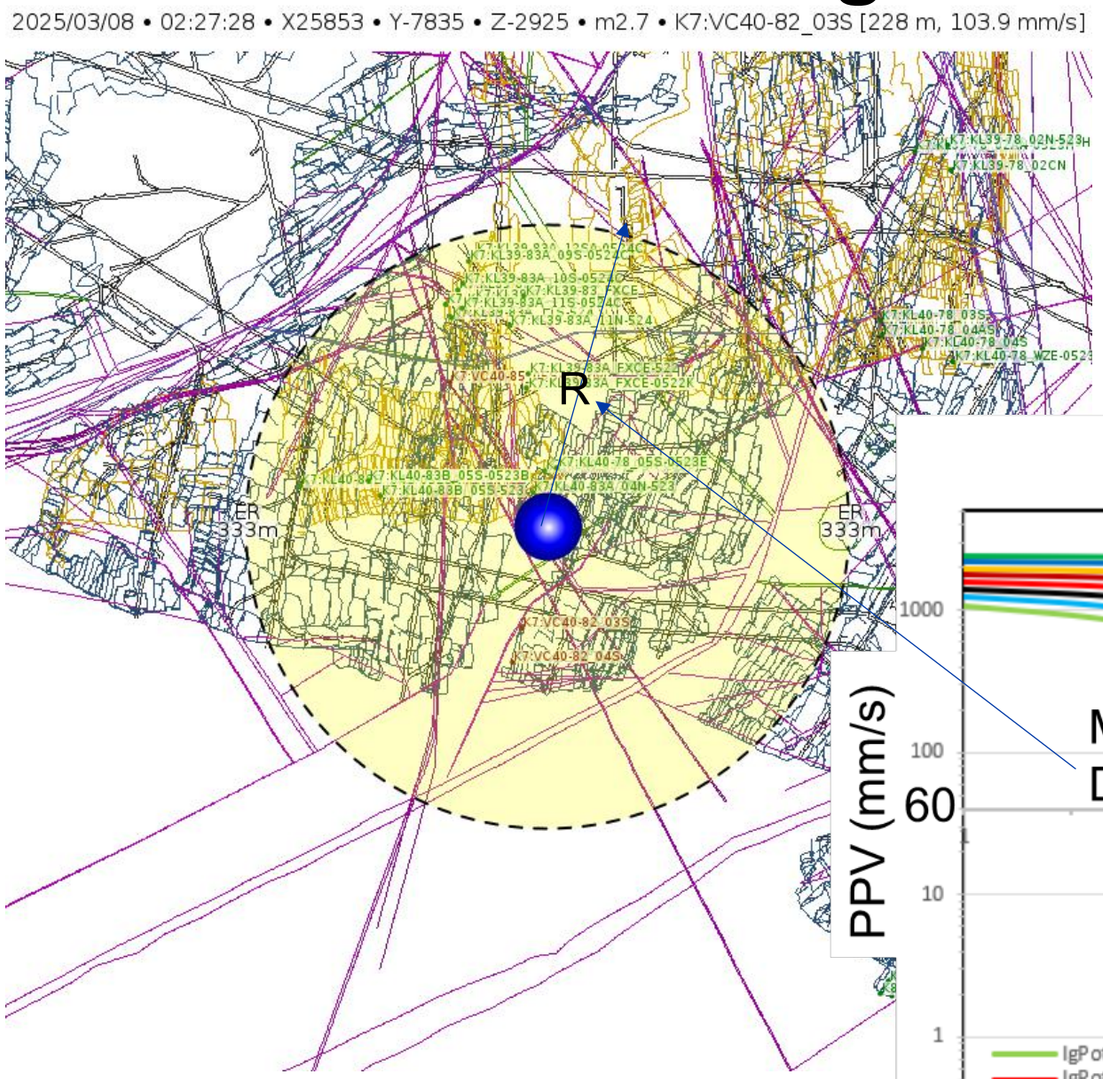
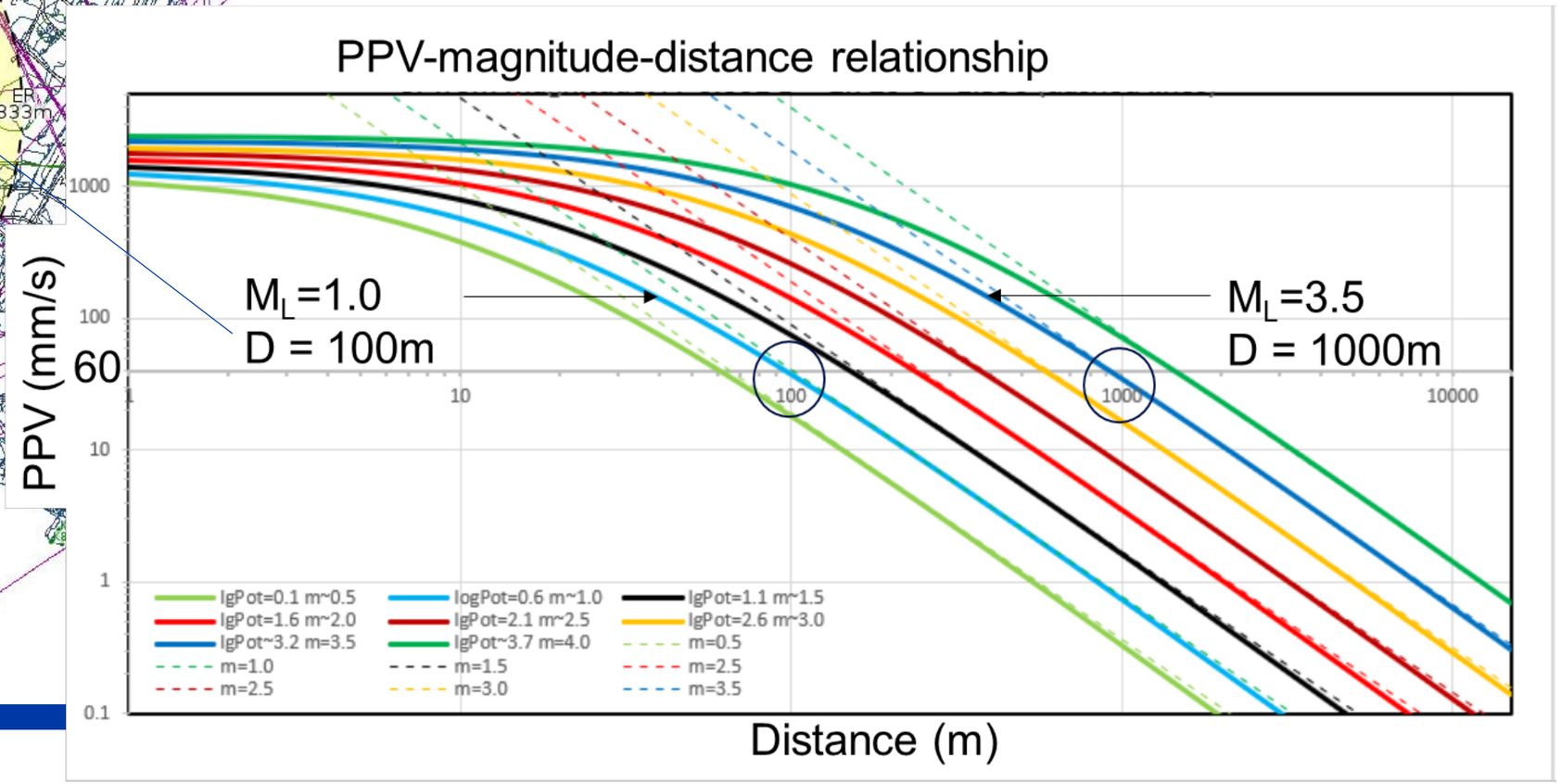
# Seismic event magnitude and PPV – withdrawal radius

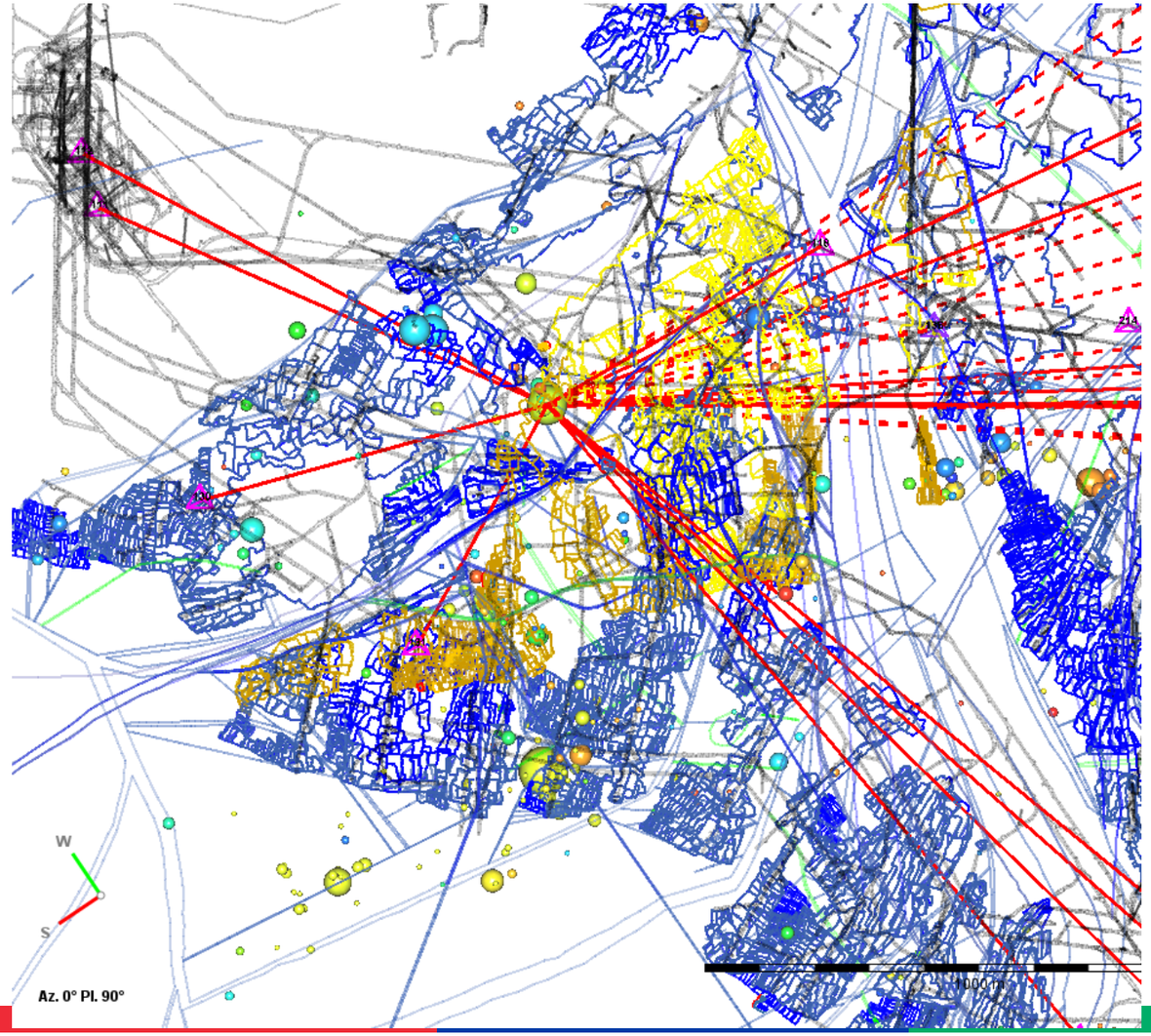



Large seismic event?

- Magnitude-PPV-distance relationship
- log(PPV) = A1*ML + B1*log(D) + C1
- PPV threshold of 60 mm/s based on back analysis at SibanyeStillwater deep level gold mines (likelihood of damage increase with increased PPV beyond 80 mm/s, with FOS we use 60 mm/s)



# Event processing and reporting




Seismic surface infrastructure (servers, communication)

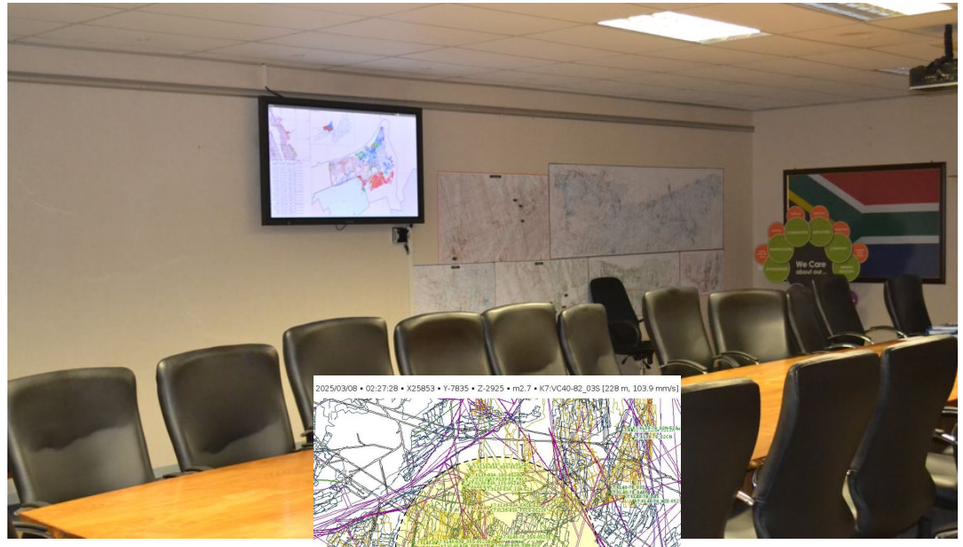
IMS (Stellenbosch)

ICT and engineering network (surface)

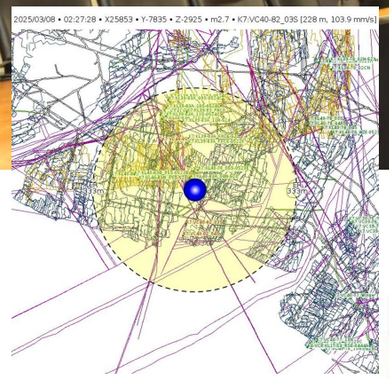
Seismic screens

Telephone network)

Boardroom



ICT and engineering network (ug)



Modem

Seismometer

Geophone

Waiting place

Stope



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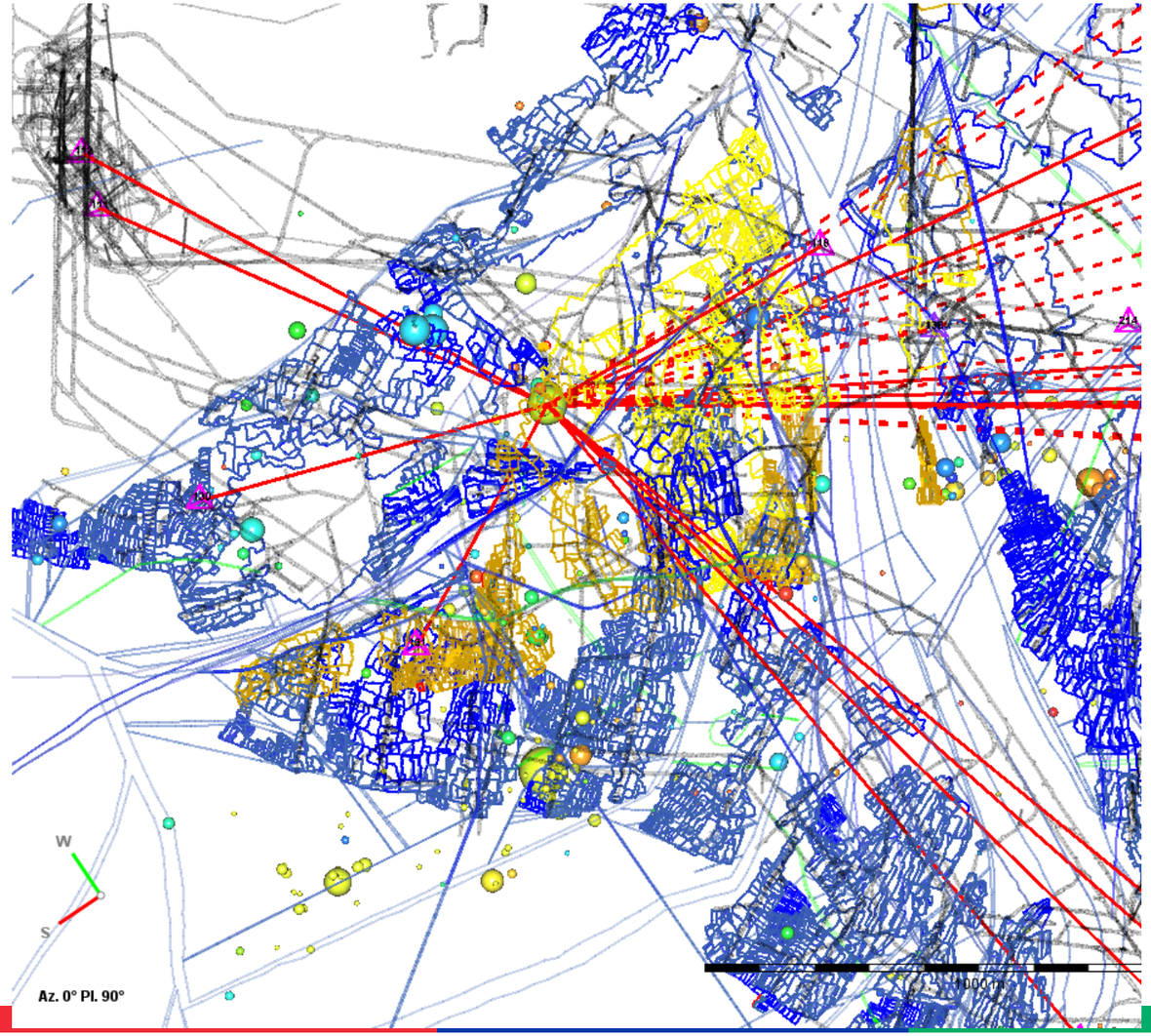
# Can we cut out all areas where comms may fail?

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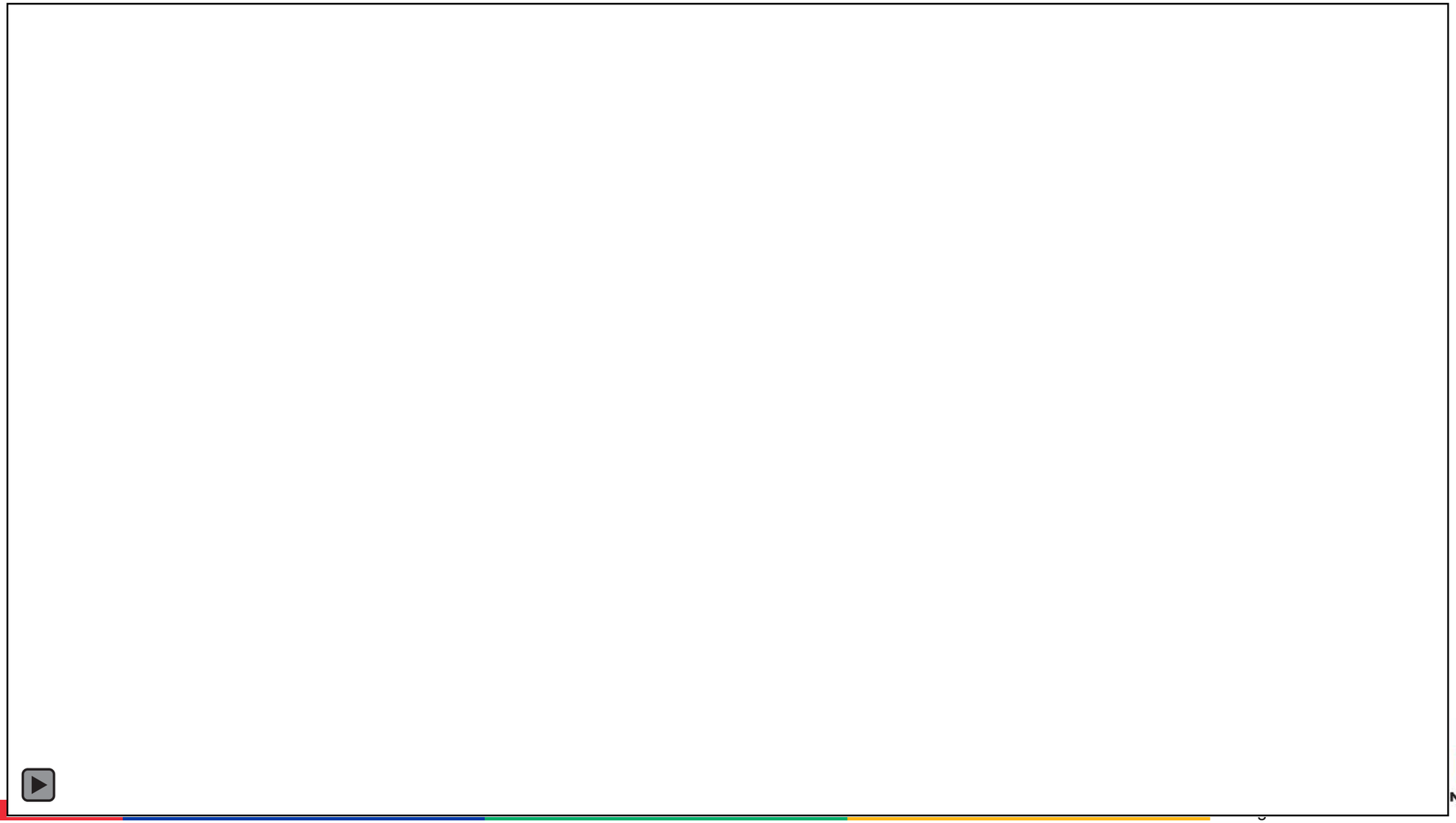
# Accelerometer connected to in-stope lights



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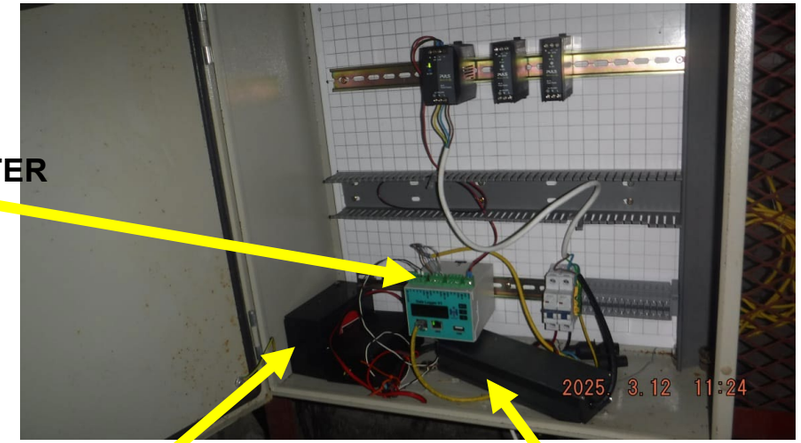
# LIGHTS INSTALLED AT MASAKHANE 38 21 EAST PANEL

EQUIPMENT
ENCLOSURE




DATA LOGGER
FOR 8G
ACCELEROMETER

LIGHTS FLASHER
CONTROL
BOX

LIGHTS POWER SUPPLY

8G ACCELEROMETER

STRING LIGHTS

LIGHTS POWER CABLE

FACE

Gully

POWER FOR
ENCLOSURE
SUPPLIED FROM
WINCH

# Using in-stope lights as a communication tool

- Piggy-back on standard in-stope lights
- Flash control box added at source of power to the lights (gully winch)
- Cheap accelerometer installed in-stope in hole drilled with standard shothole drill steel
- Accelerometer connected to data logger (contained in enclosure for power connection)
- Threshold for PPV set to 60 mm/s
- When ground movement with PPV ≥ 60 mm/s is recorded, the in-stope lights flash dim-and-bright
- Based on training, the miner interprets the flashing lights that he must withdraw his crew and phone the control room
  - This withdrawal system is fully contained in the stope and does not rely on a communication system to surface and back
    - Reduced risk of communication failure
    - Withdrawal signal is immediate (not waiting for event to be processed)
  - PPV is measured directly rather than calculated through formula

- It is also possible to send a message from surface to the control box to induce flashing lights and can be used to get a message from the mine overseer to the miner underground that he must phone for instructions

Anglo American Platinum – Dishaba Mine

# Thank you

# #MiningMatters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