Underground Mining Group

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Co-Chair
Agenda

Purpose: Recruitment and Support

• Background
• Road Map
• Projects
• Conclusion
Background

Underground Mining Technical Group

• 11 members incl. 8 mining companies
• 2 co-chairs (from Glencore and Agnico Eagle)

Wider group of 50+ participating in workshops and forums
Road Map

Electrification: High capacity BEVs

Continuous Process:
- Continuous muck & transport
- Mechanical cutting
- No buffers
- Closed water & air system
- Automated production

Real Time Knowledge:
- Short interval control
- Digital platform
- Real time optimisation
- “Big” data-sophisticated optimisation
- Autonomous decisions

Remote Locations:
- Remote operations
- Virtual presence
- Distributed experts

Consistent Product:
- On-face separation
- Concentration upstream
- Controlled PSD
- No dilution
- Zero waste to mill

Efficient Collaboration:
- Unified voice
- Standard platform
- Franchise not silo
- Collaboration ecosystem

Smart U/G mining
Autonomous remote mine
Micro mine
Battery Electric Vehicles (BEV’s)
Battery Electric Vehicles (BEV’s)

• Business case
  – Health
  – Reduce ventilation and refrigeration energy
  – OPEX savings
  – GHG reduction
BEV Guidelines

• First guideline for U/G BEVs
• Published April 28, 2017
• Partnership w/ Global Mining Standards and Guidelines Group (GMSG)
• Less than 1 year from concept to publication
BEV Development

• Consortium of mining companies pushing development of high capacity BEVs
  – Agnico Eagle, Glencore, Goldcorp, NAP, Vale
• 14-18 tonne LHDs, 40-50 tonne trucks
• RFP this month, orders placed in Q4
Mechanical Cutting
Mechanical Cutting

• Business Case
  – Safety (less people at the face)
  – Step change in Development rates
Mechanical Cutting

• Consortium of mining companies pooling resources to learn about mechanical cutting
  – Agnico Eagle, Barrick, Glencore, Vale
• Goal is to test at one or more member’s mine site with results applicable to all members
**Short Interval Control (In shift performance)**

- Forums to allow miners to share experience and learn from industry experts
- 1\textsuperscript{st} was in Sudbury in April, will be held ~ 3 times per year
How to tap into hidden value

Managing variation in the mining processes ....

**Digitizing In-shift Performance**

**Critical to success**

- Management Routines (escalation)
- Line-up
  - Supervisor to Operator
- In-shift performance (Short interval control)
- End of shift status & hand-off
  - Supervisor to supervisor

**Success** = Right job, right time, right people, Better way

... can lead to a step change in business performance with little or no capital investment.
Future Projects – SI & RTC Guideline

• Short Interval & Real-time Control Guideline
• New guideline with GMSG focussed on short interval and real-time control being planned
• Goal is to capture expertise from around the world to help speed adoption & hence mining efficiency
Future Projects – BEV Guidelines 2\textsuperscript{nd} Ed.

- Technology is developing so rapidly that there is already new material to be added
- Work on a 2\textsuperscript{nd} edition of the guidelines will be started Q4 of this year
Roadmap Support

• BEV’s and Wired Mine are enablers for Autonomous applications
• Require open architecture (OEM’s) to enable mines
Summary

• Join CMIC and support a unified voice
• Not too late to participate in the Underground Mining projects
Thank-you