



# Increasing value from our mines

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Capital Markets Day 2016 | 16 March

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# Increasing value from our mines

Operational excellence

Focusing on profitable growth

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# Creating value through operational excellence

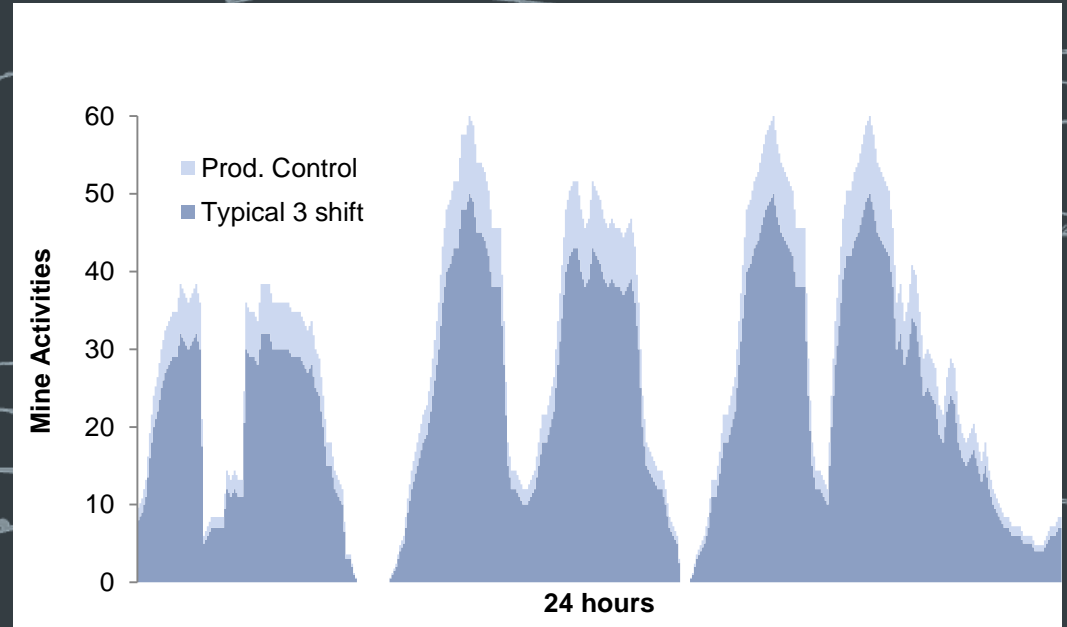
**Production control**

**Mine automation**

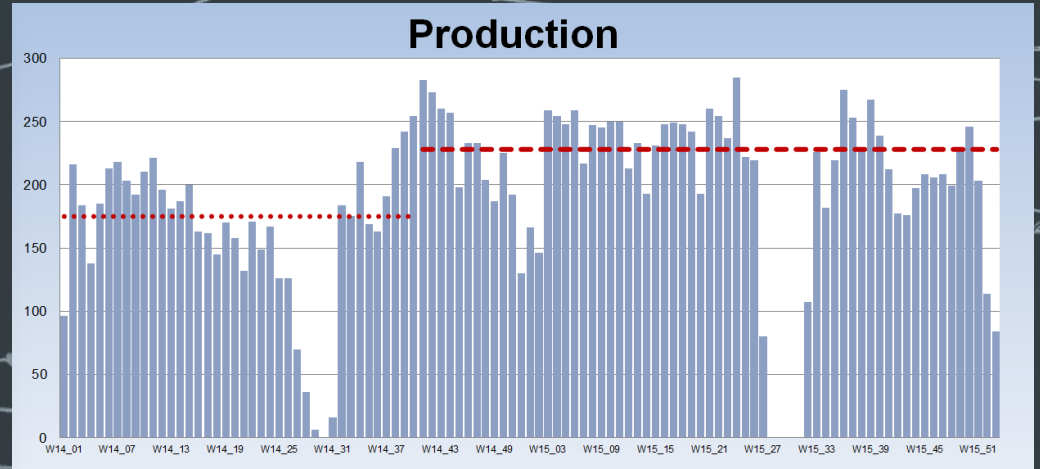
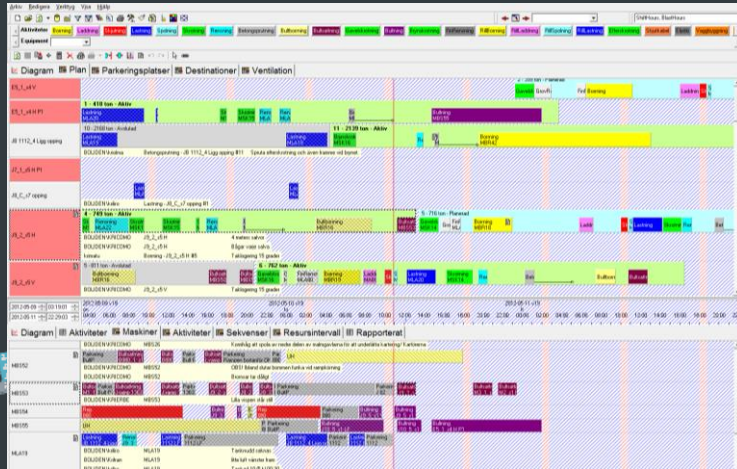
**Mineral process development**

**Preventive maintenance**

# Centralised production control increases productivity



# >20% higher productivity through planning



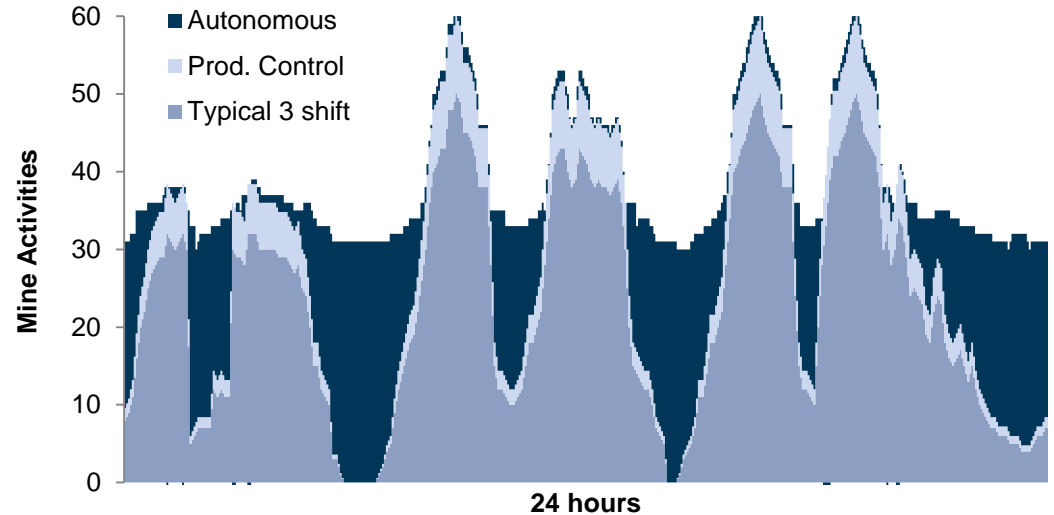
# Mobile control systems increase efficiency at concentrator

- Integrated system for mine and concentrator
- Continuous real-time operational and maintenance data
- 24/7 off site access through mobile control room



# Autonomous machines adds production hours

- Ability to mine 24/7
  - Loading and hauling ore after and during blasting/ventilation
  - Continuous long hole drilling
  - Autonomous transportation between loading and unloading
- ~50% more time available for autonomous activities in the mine
- Improved safety



# Autonomous loaders – example Garpenberg

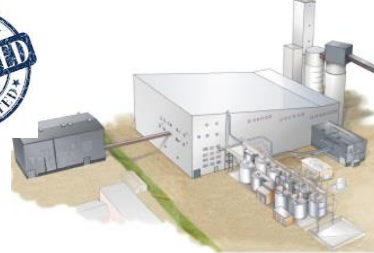
- Started in 2011
- 18% of mining currently performed with autonomous loaders
- Target to increase autonomous utilisation to 80% by 2019
- WLAN in vital parts of the mine
  - Operated from surface 2015
- To be rolled out in other underground mines





# Mineral process development

Hot leaching AuTe



1968

**Aitik**

Autogenous grinding

2013

**Kankberg**

Gold (45 => 85%)  
Tellurium (& Ag)

2015

**Tara**

Antimony  
removal

**Example of completed R&D projects**

2010

**Boliden**

Fenton  
Thio-salts

2014

**Garpenberg**

Nitrogen  
removal



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# Tara reduced antimony emissions by 50%

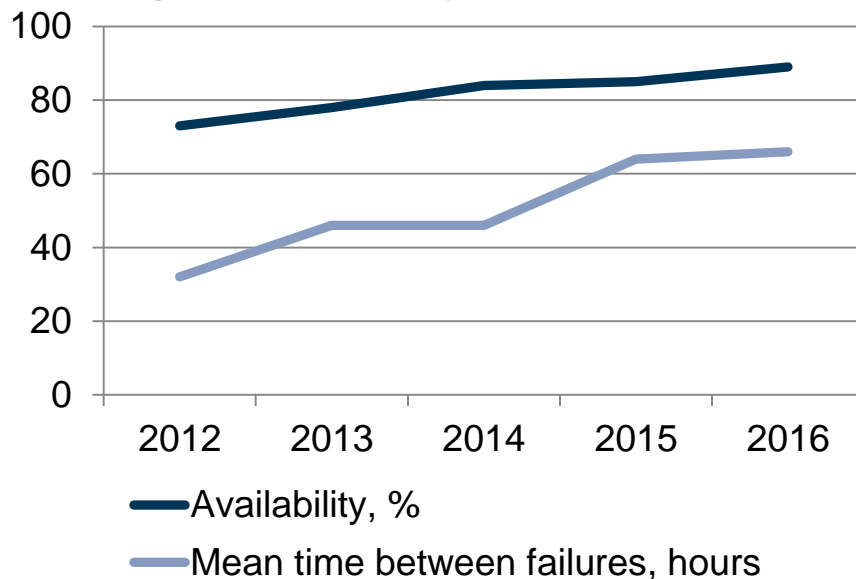
- Reduced emissions and maintained production capacity
- Low capex & opex solution tailored for Tara
- Chemical precipitation of antimony
- Fast development and execution phase
  - Took 16 months from idea to fully-up and running



# Preventive maintenance lowers downtime



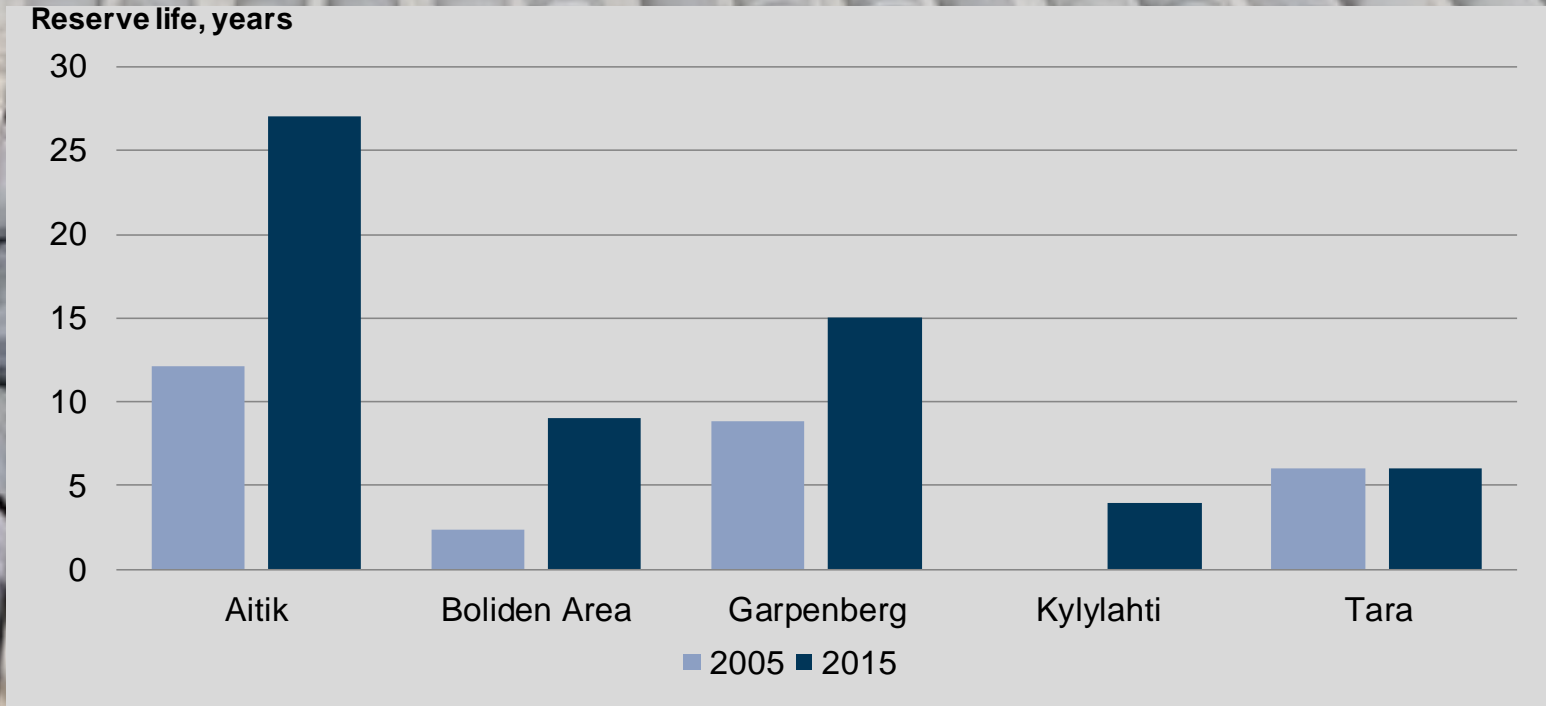
## Higher availability of Aitik's shovels



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# Increased mine lives

Our largest mines have long life and competitive positions

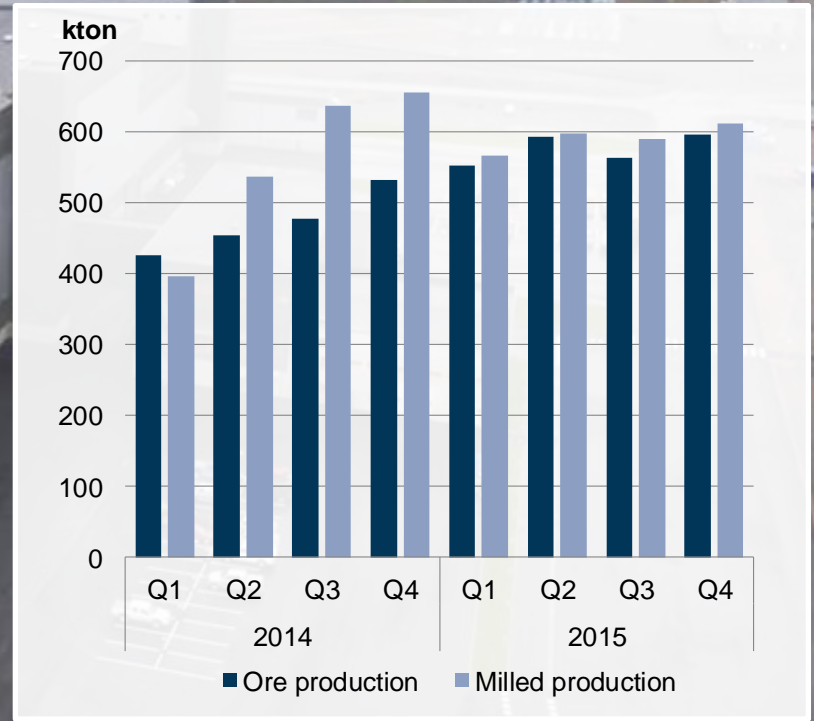




# Focused efforts in exploration

- Strong exploration results in 2015
  - Increases in mineral reserves at Aitik, Garpenberg and Tara
  - Two new mineral resources: Nautanen (Aitik) and Rävliiden (Boliden Area)
- Outokumpu field
  - Disappointing first year, 2015 – 4 years reserve life in Kylahti
  - Increased efforts 2016
- Tara
  - Encouraging results 2015 – 6 years reserve life
  - Increased efforts 2016

# Garpenberg expansion ramped-up on time & capex



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# Aitik expansion – what we have said and done

## Phase 1: capex 600 MSEK, whereof 200 MSEK spent

- Crusher reinforcement done
- Water pumping done
- Electric sub-station done
- New surface crusher not done

## Phase 2: capex not announced

- New in-pit crusher including conveyor
- Water treatment
- De-sulphurization





# Revised plan for Aitik – focus on availability

- New environmental permit Q1 2016
- Reserve Cu grade 0.23 (0.22)
- Extended reserve life
- New crusher set-up
  - Surface crusher – commissioning 2018
  - In-pit crusher – decision after 2020
- De-sulphurization – after 2020 (if needed)

## Revised production plan

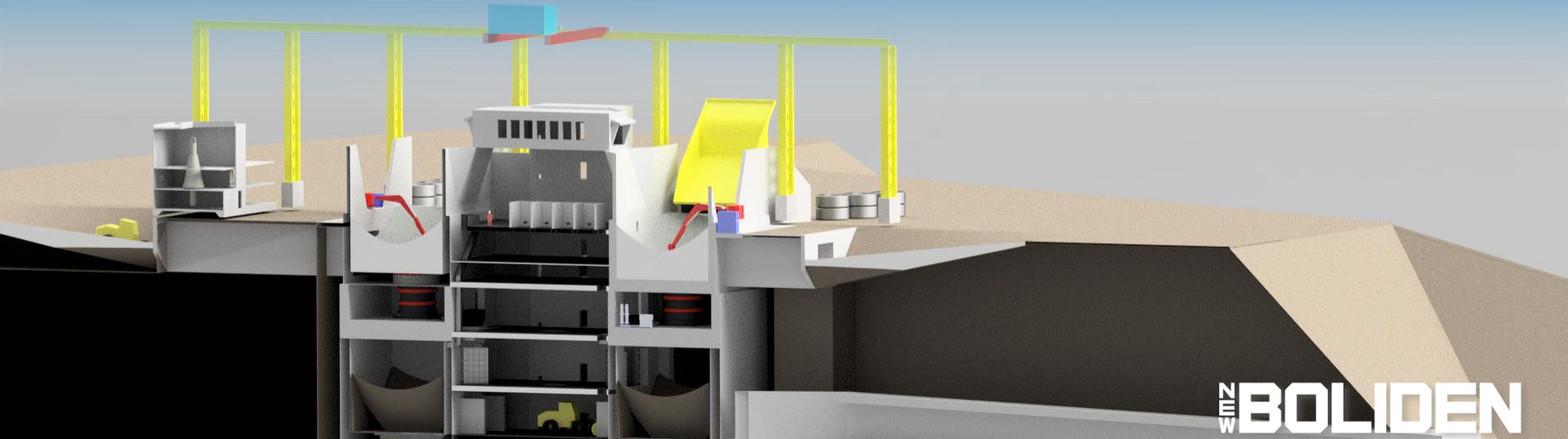
- Copper grades
  - 2016: 0.21
  - 2017-19: Above reserve grade
- 45 Mton 2020





# New surface crusher to improve reliability

- Construction 2016-2017, commissioning 2018
- Built in double-crusher
- Facilitate maintenance
- Capacity 8,000 ton/h



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# This plan delivers improved control

- Higher availability from the mine
- Higher visibility in production, grade and cost
- Remaining capex of 1 BSEK (2016-2018)
  - New surface crusher
  - Water treatment
  - Power supply





# Q&A

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