

# Proximity Technology Update

Hadley Richardson  
South East Account Manager

24<sup>th</sup> of May, 2011



# Agenda



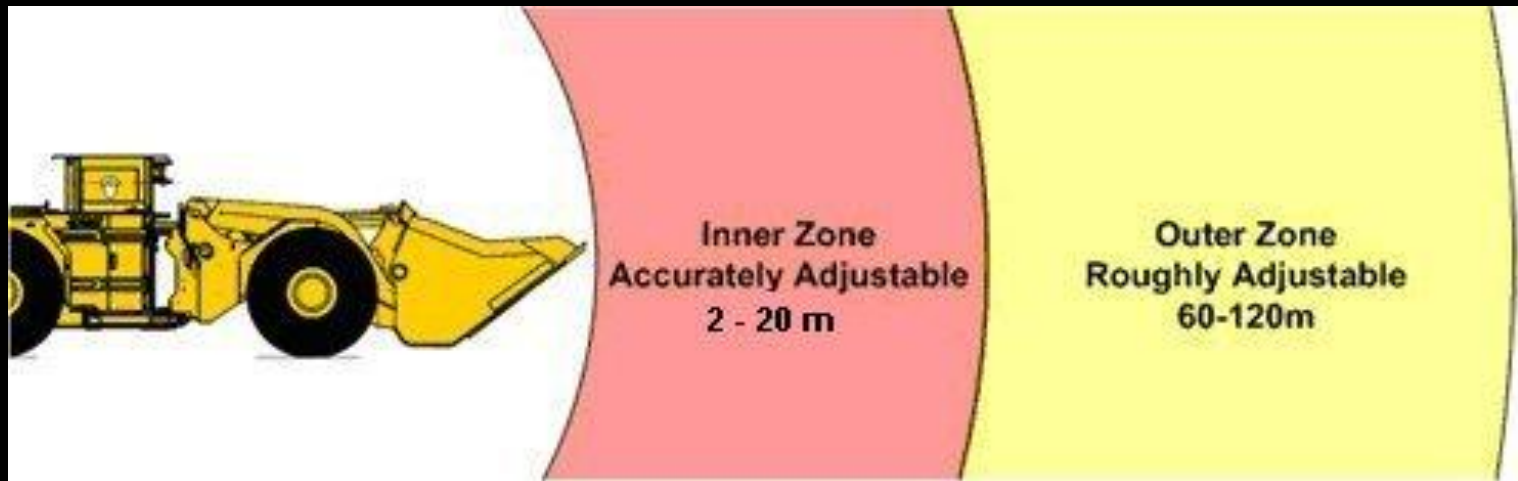
- Objective
- Proximity Detection/Collision Avoidance Portfolio
  - Continuous Miner/Shuttle Car/LHD and Personnel
  - Metalliferous Mobile Plant and Personnel
  - Longwall and Personnel
- Effectiveness & Additional Controls

# Why Proximity Detection

**MINE SITE**  
TECHNOLOGIES

Proximity Detection provides an **ADDITIONAL CONTROL** to standard safety procedures

It provides **AWARENESS** to operators of mobile plant of the presence of other plant or people



# Agenda

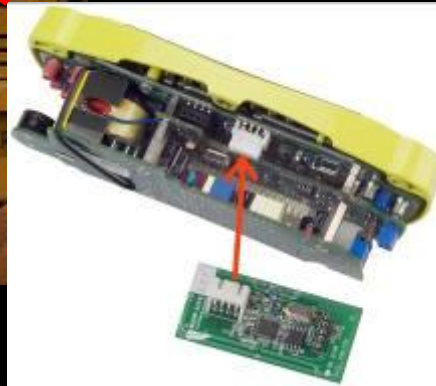


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# Components

**MINE SITE  
TECHNOLOGIES**

Means of identifying individual



...and machine





# Components

**MINE SITE**  
TECHNOLOGIES

Means of generating magnetic field around machine....



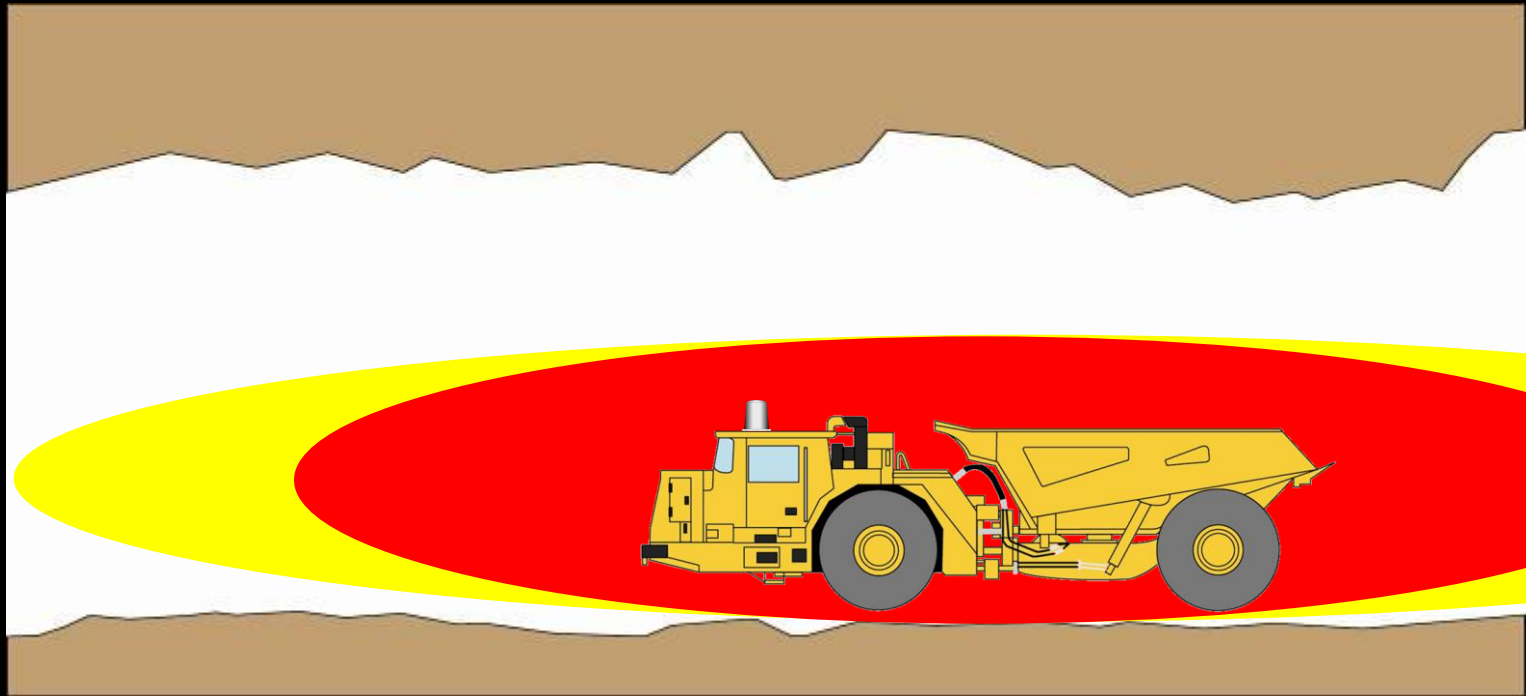
...receiving tag transmissions  
– and alerting operator



# Key Operating Parameters

**MINE SITE**  
TECHNOLOGIES

- Outer Zone 60m - 120m
- Inner Zone 2m – 15m

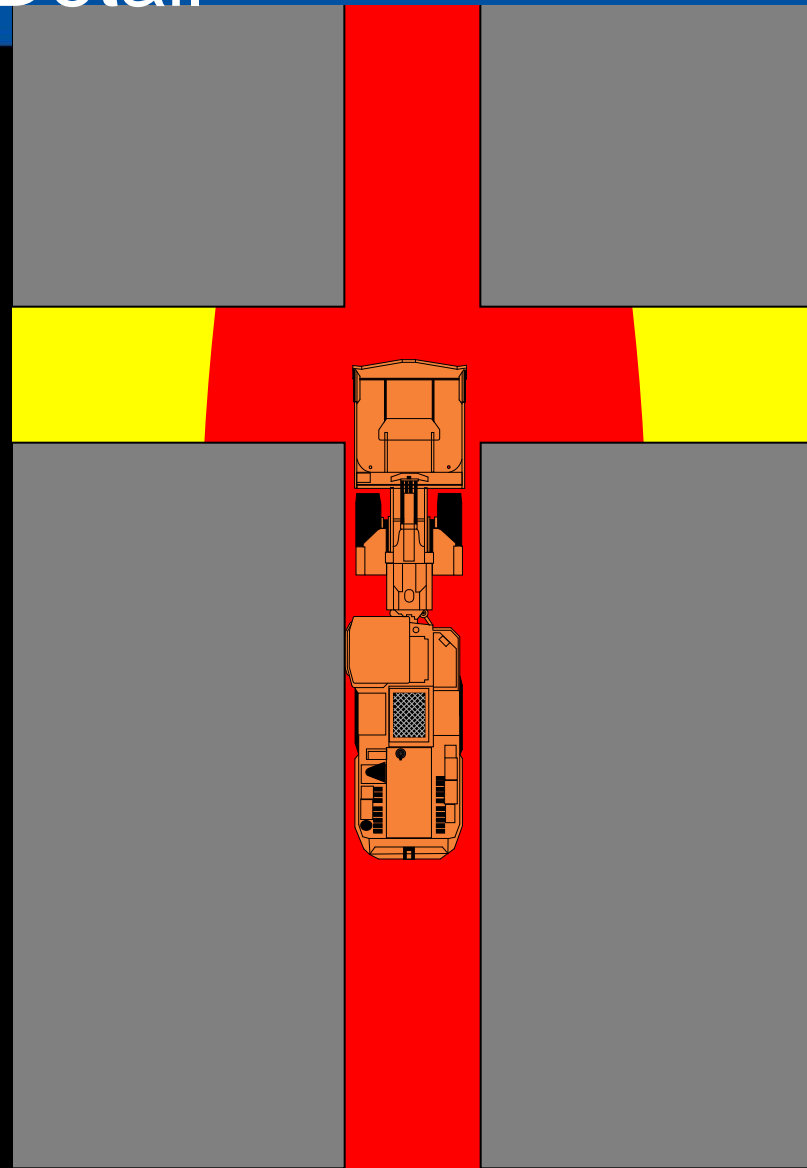


# Outer Zone Detail

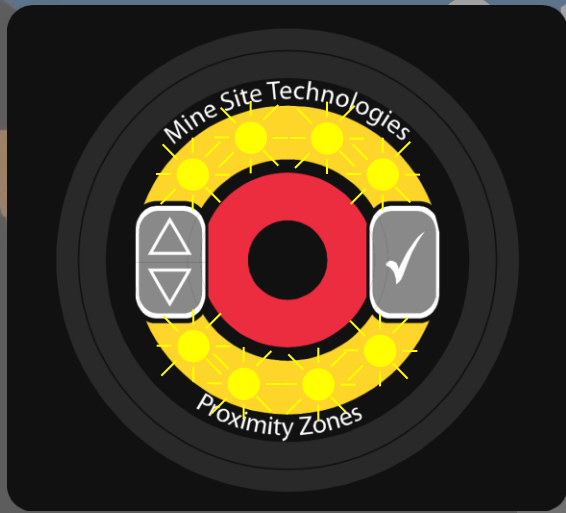
**MINE SITE  
TECHNOLOGIES**

Around corner detection ability typically:

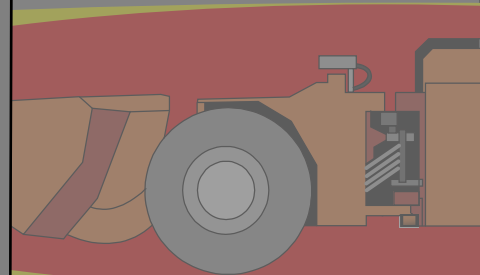
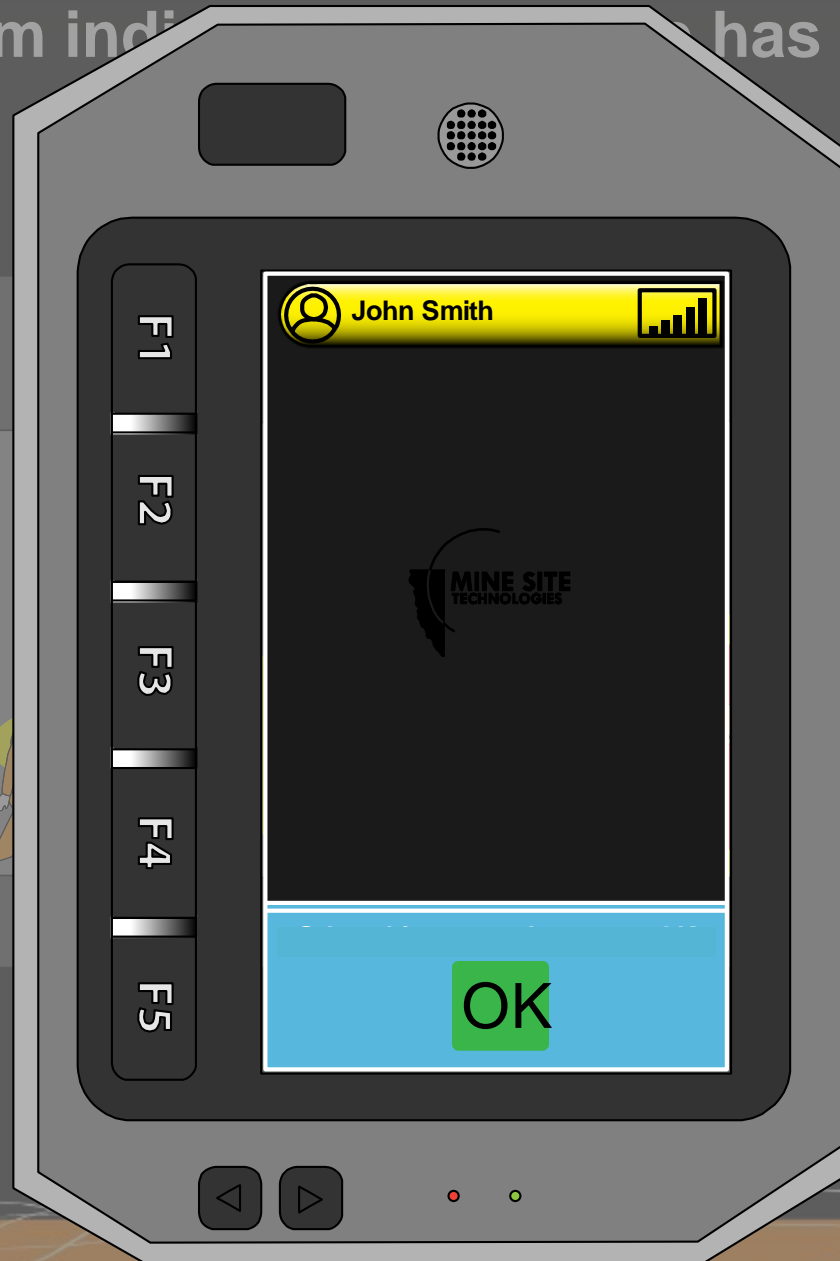
- At 60m – Detects 20m around corner.
- At 30m – detects 40m around corner.



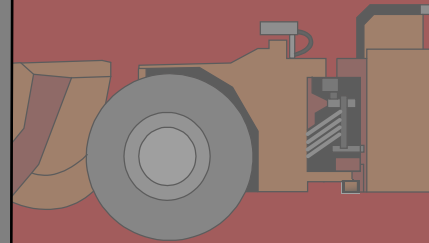
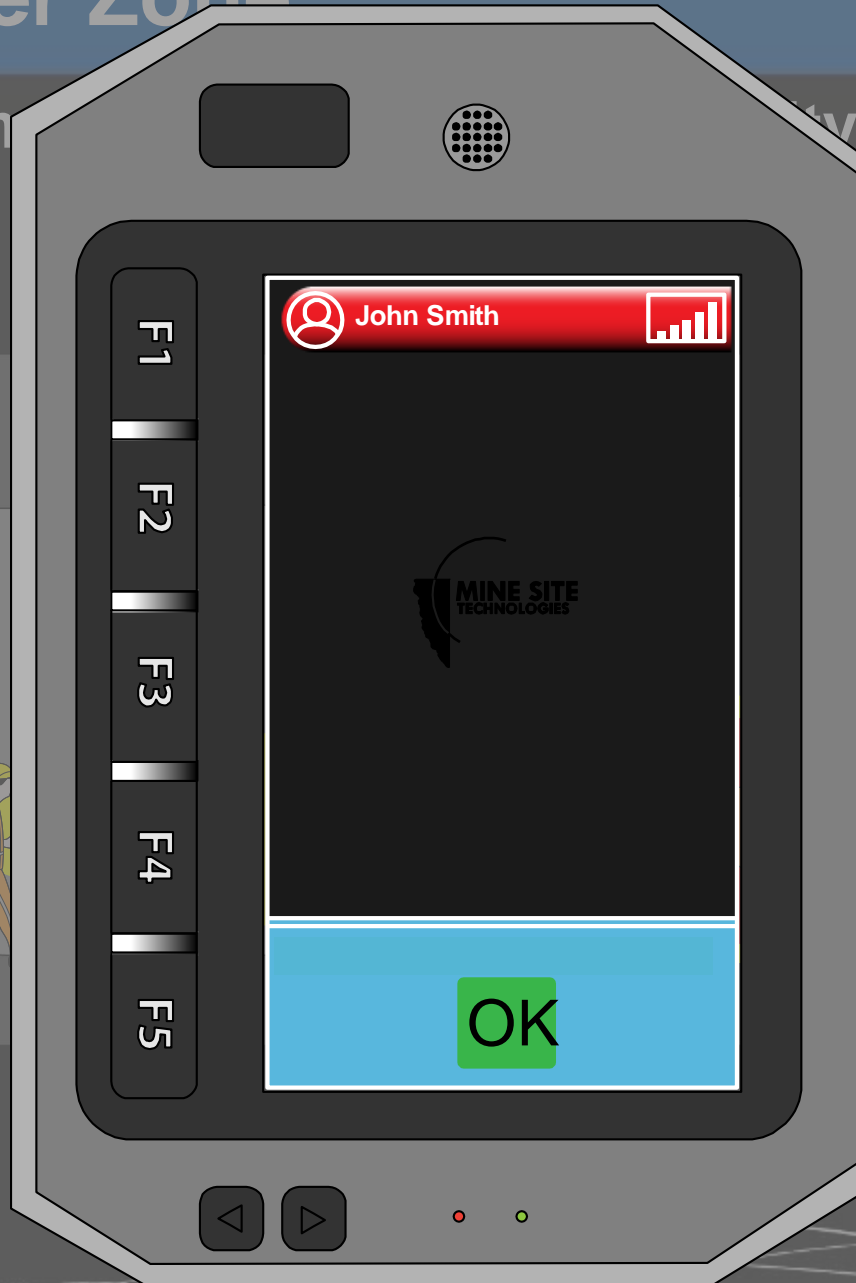




Center Zone  
m indi has been detected



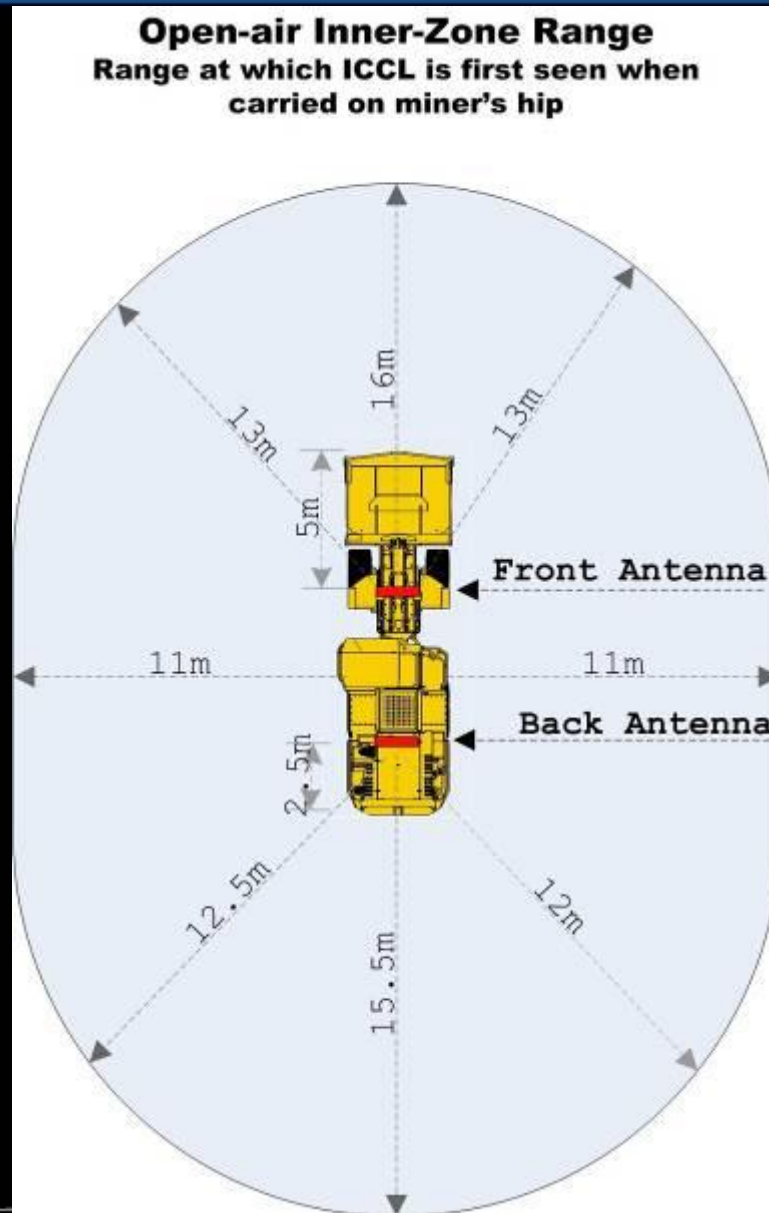






# R2900G Inner Zone range

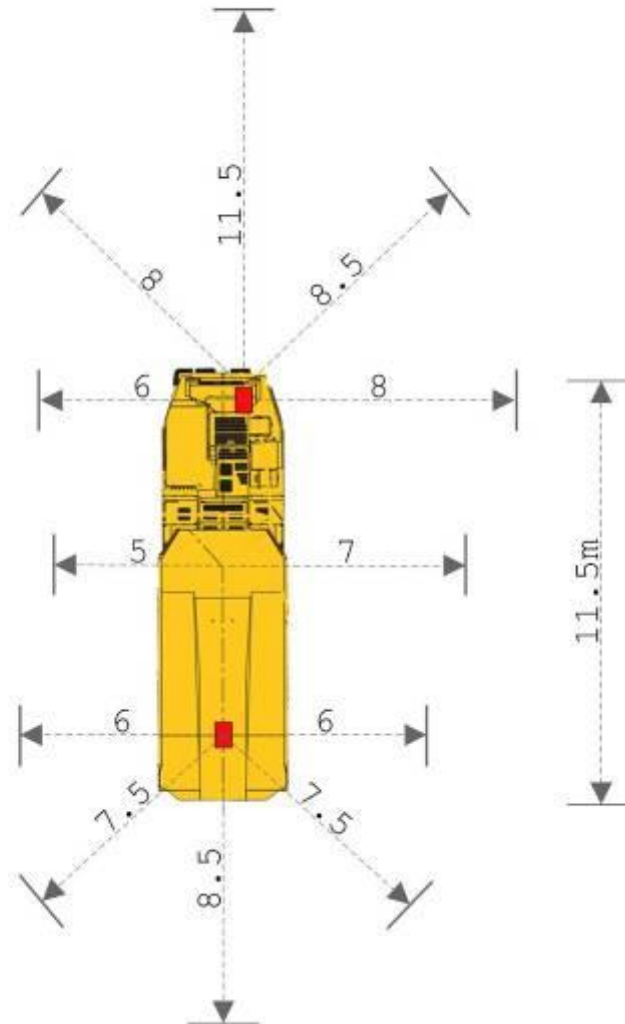
**MINE SITE**  
TECHNOLOGIES



# AD55B Inner Zone Range to Caplamp

**MINE SITE**  
TECHNOLOGIES

**AD55 Open-air Inner-Zone Range**  
Range at which ICCL is first seen when carried on miner's hip





# MineDash – Reporting Tool

**MINE SITE**  
TECHNOLOGIES

Minedash - Mozilla Firefox

File Edit View History Bookmarks Tools Help Deleted Links

http://localhost:39845/overview/perspective.html#maintenance/report[OPERATING\_TRENDS]24[12]

Minedash Most Visited Latest Headlines

**Minedash**

**MINE SITE TECHNOLOGIES**

Map View Machine Reports Summary Reports

**Assets**

- Kiruna 1059
- Kiruna 1079
- Kiruna 919
- Kiruna 1058
- Kiruna 1010

**Report List**

- Current State
- Alarms
- Operating Trends
- Utilisation
- Production Load Cycles
- Proximity Events

**Proximity Events**

**Reporting Period**

Last Hour This Shift Last Shift Other Start Time: May 2009 Fri 15 Other End Time: May 2009 Fri 15

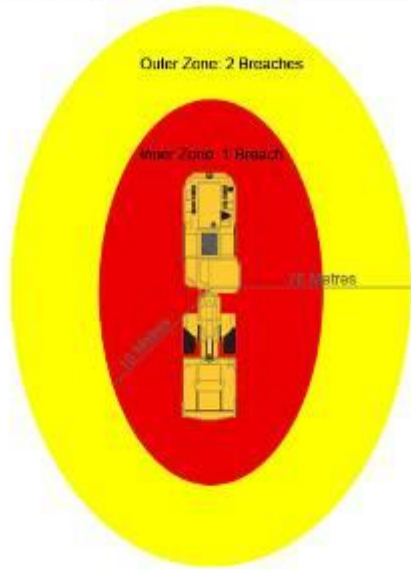
**Inner Zone Breaches**

Time	Tag	Location	Duration (HH:MM:SS)	Time to Acknowledge
Inner Zone Breaches in the Last Hour				
Thu Feb 19 11:26:00	Chris Snell	One Pass 1	0:0:10	N/A
Thu Feb 19 11:10:00	Rob Paine	Incline Point 3	1:10:22	0:0:12
Thu Feb 19 11:02:00	Christian Fischer	Crusher 2	0:09:17	0:0:21

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Thu Feb 19 10:49:12	Matt Brown	Kiruna Garage	0:00:10	N/A
Thu Feb 19 10:33:10	Hadley Richardson	Mess Hall	0:03:22	0:0:32
Thu Feb 19 09:02:00	David Byron	Crusher 2	0:09:17	0:0:41

**Current Proximity Breaches**



Done

# Sites deployed or installing



Jundee & Tanami



MIM George Fisher



Olympic Dam, Cannington



Test Mine, Tampere

# Agenda



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# Mobile Equipment Proximity Detection

**MINE SITE**  
TECHNOLOGIES

- MST is the exclusive technology partner with Strata Proximity Systems HazardAvert System
- Project underway to incorporate this industry-leading proximity detection technology with MST's proven cap lamp
- ANZ Ex approvals well advanced for on-vehicle systems

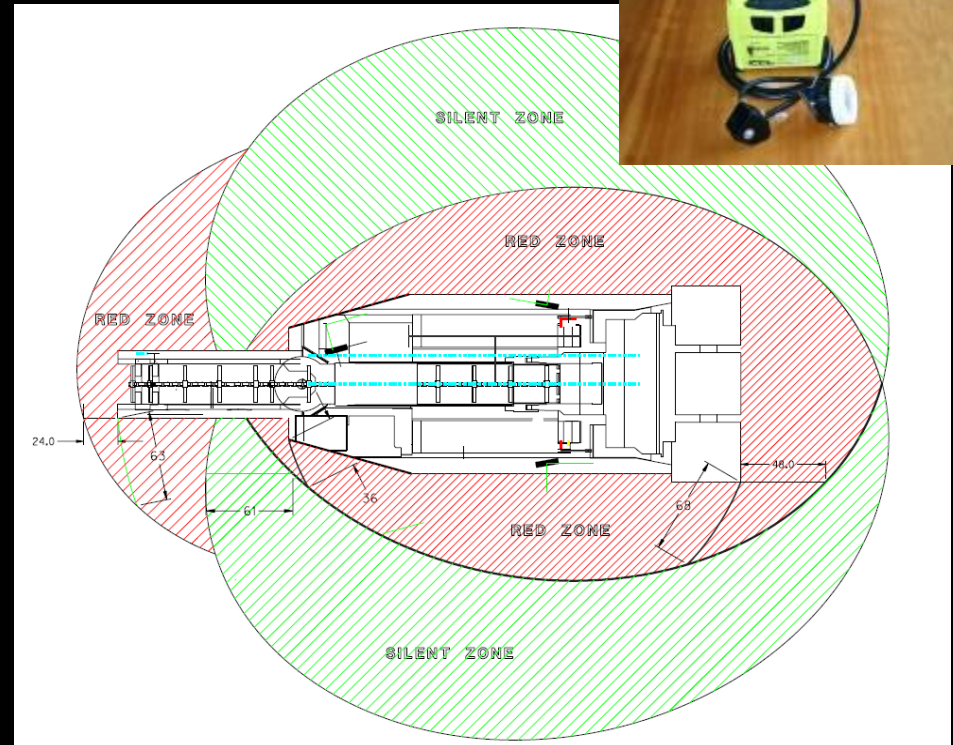
***HazardAvert®***



# HazardAvert - overview

**MINE SITE  
TECHNOLOGIES**

- Magnetic Field Generators mounted at key points surround machine with repeatable field
- Multiple Generators can create definable zone shapes to satisfy tight tolerance work spaces
- Proximity Alerts communicated to the pedestrian and machine operator
- Silent Zones programmable. Allows miner to see cutter while staying out of the turning radius of Continuous Miner





# Continuous Miner System – 4 Generator

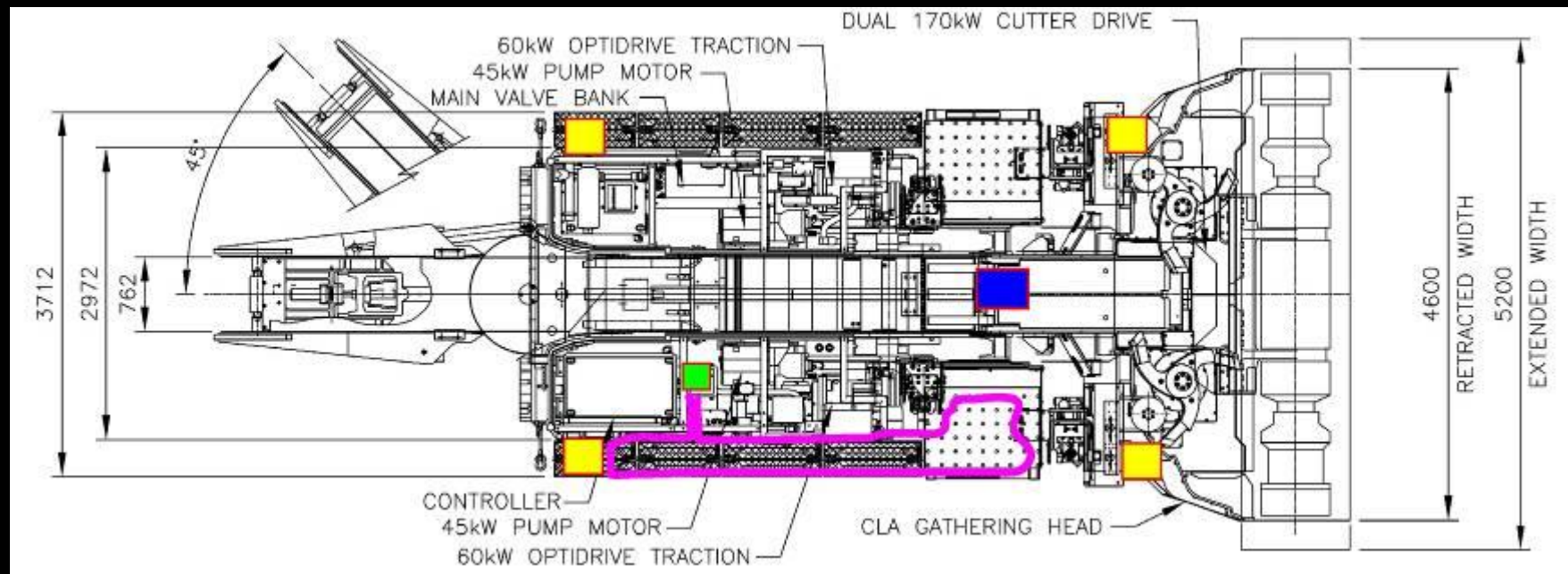
**MINE SITE**  
TECHNOLOGIES





# Setup on a Joy 12CM30

**MINE SITE**  
TECHNOLOGIES



# Zone programming and operation

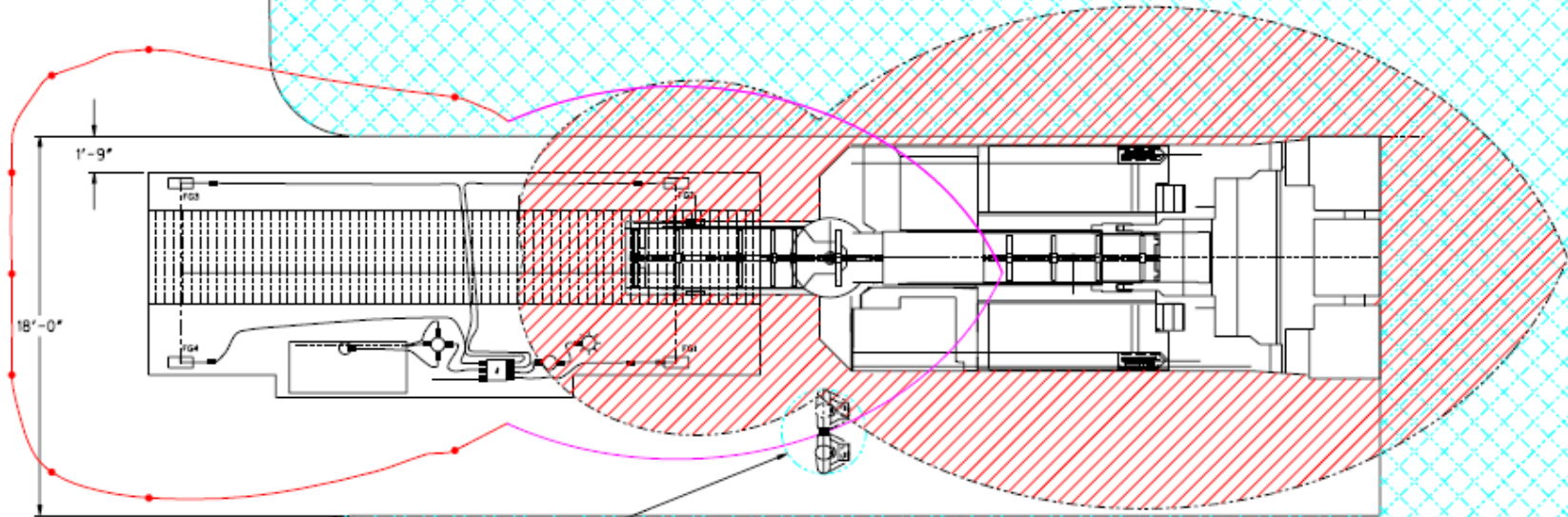
The logo for MINE SITE TECHNOLOGIES, featuring the company name in white capital letters next to an orange graphic element that resembles a stylized mine or a piece of equipment.

**MINE SITE**  
TECHNOLOGIES

- Established after Risk Assessment and influenced by many parameters including
  - Braking distance
  - Desired position of people/operators
  - Safe Operating procedures of machine
  - Mode of machine in mining sequence

# Continuous Miner - left

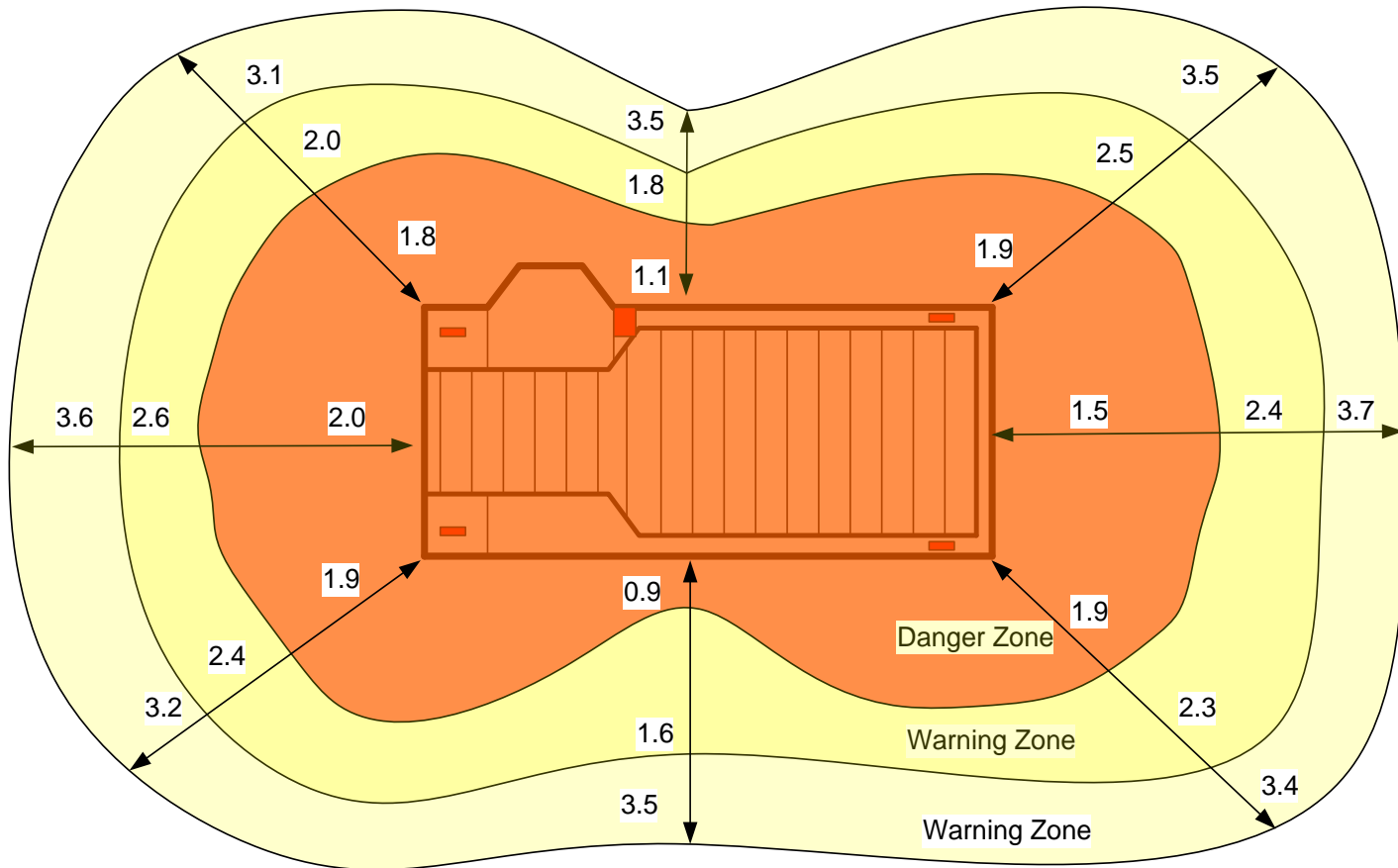
**MINE SITE**  
TECHNOLOGIES



MINER POSITIONAL ENVELOPE (MPE)  
PAD ON LEFT OR RIGHT SIDE

# Shuttle Cars

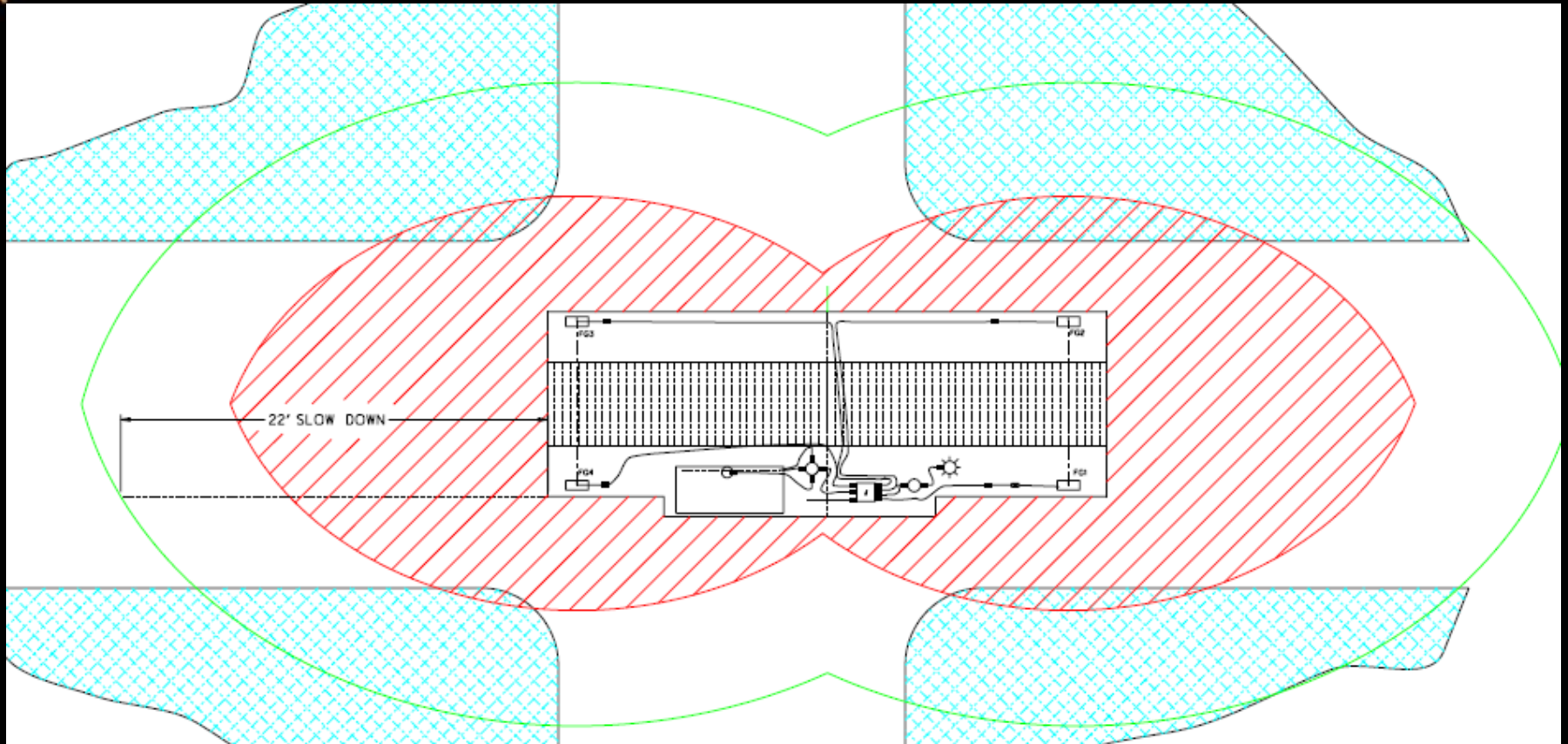
MINE SITE  
TECHNOLOGIES





# Shuttle Car – medium or high tram

**MINE SITE**  
TECHNOLOGIES



# HazardAvert® UG Coal System



**MINE SITE**  
TECHNOLOGIES

- Can automatically slow and/or stop machine
- Can stop machine if
  - power is lost
  - size of field reduces on any generator
  - cable is cut or disconnected
  - communication degrades
- Redundant receivers (four for a CM or SC)
- Warns each machine operator
- Remote stop capability for miners and operators
- Stops machine if miner or operator ICCL battery low



# ICCL with Personal Alert Device



# ICCL with Personal Alert Device



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# Tracking on the Longwall

## Objective

- Identify presence or absence of personnel on a longwall accurately, repeatably and reliably, and transmit this location information to a control system

## Requirements

- Means of identifying support/shield/chock and individual
- Means of transmitting this data and converting it into position information
- Means of communicating this to a control system

# Tracking on the Longwall - solution

**MINE SITE**  
TECHNOLOGIES

- Means of identifying support
  - Support identified by means of an “exciter” which is mounted to a support and programmed with that support’s unique number



# Tracking on the Longwall - solution

**MINE SITE**  
TECHNOLOGIES

- Means of transmitting this information to LW control system
  - The Wireless Access Point/Network Switch, the number and location of which are to be determined, receives this information and routes it to a “positioning engine” on a server
  - The server then provides this positioning information to a control system on the network





# Tracking on the Longwall

**MINE SITE  
TECHNOLOGIES**

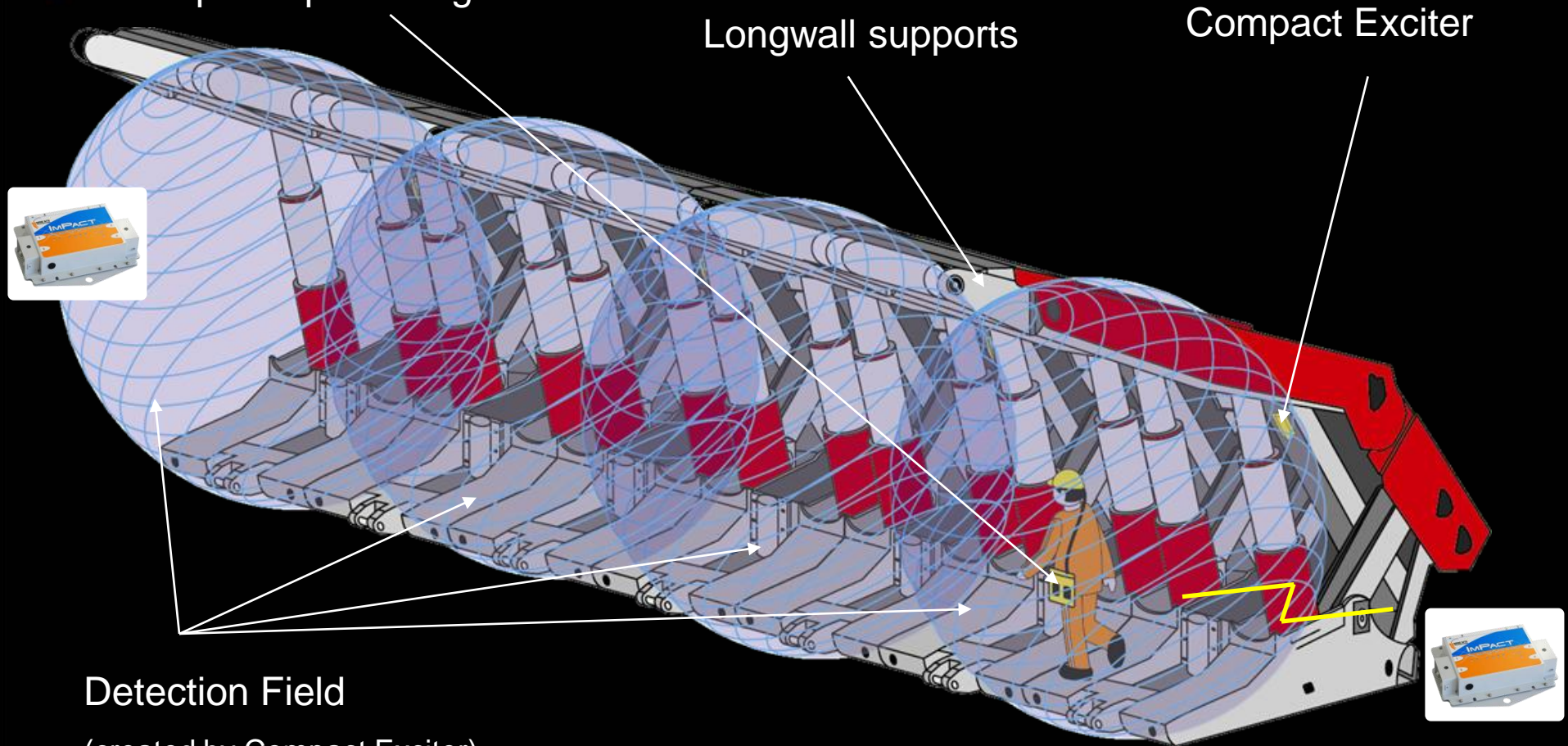
Cap Lamp with tag

Longwall supports

Compact Exciter

Detection Field

(created by Compact Exciter)



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# Control Effectiveness

Review convened to provide additional risk engineering input into the planned introduction of Proximity Detection into Underground Mines, including Functional Safety and preliminary SIL assessments.

Areas for additional controls:

- Operational impact of technology (nuisance alerts, over-alarming)
- Avoiding generation of hazardous conditions when continued operation is safe
- Maintenance issues
- Interaction of system with OEM's systems
- Component failure

# Control Effectiveness

URANIUM  
E-mail communication notice



## GENERAL INFORMATION

18 January 2011 Sending department: Mine Load & Haul

### Underground Proximity Awareness Trial

As part of our commitment to safety the Mine Production department is conducting a pilot project to test the suitability and effectiveness of proximity awareness sensors on underground mobile equipment.

The solution we are trialling involves having a warning detection system that would alert a heavy vehicle operator that other equipment or personnel are in close proximity.



#### What is happening now?

Work has commenced fitting out 3 loaders, 5 trucks, 20 LVs and a variety of cap lamps. There is also work scheduled in the upcoming weeks to install cables around the 420 Plat, 420 Fuel Bay, Whenan grizzlies and 56 Fuel Bay.

Controlled simulations are scheduled to occur in February and April, and will involve a number of pre-determined scenarios. From the trial results and operator feedback, a decision will be made whether the technology will be used throughout the mine.

- Communication
- Maintainability / Operability review prior to commencement of any trial
- Silent trials - no alarms or control action
- Feedback - review and update system
- Trial in alarm mode
- Trial in control mode

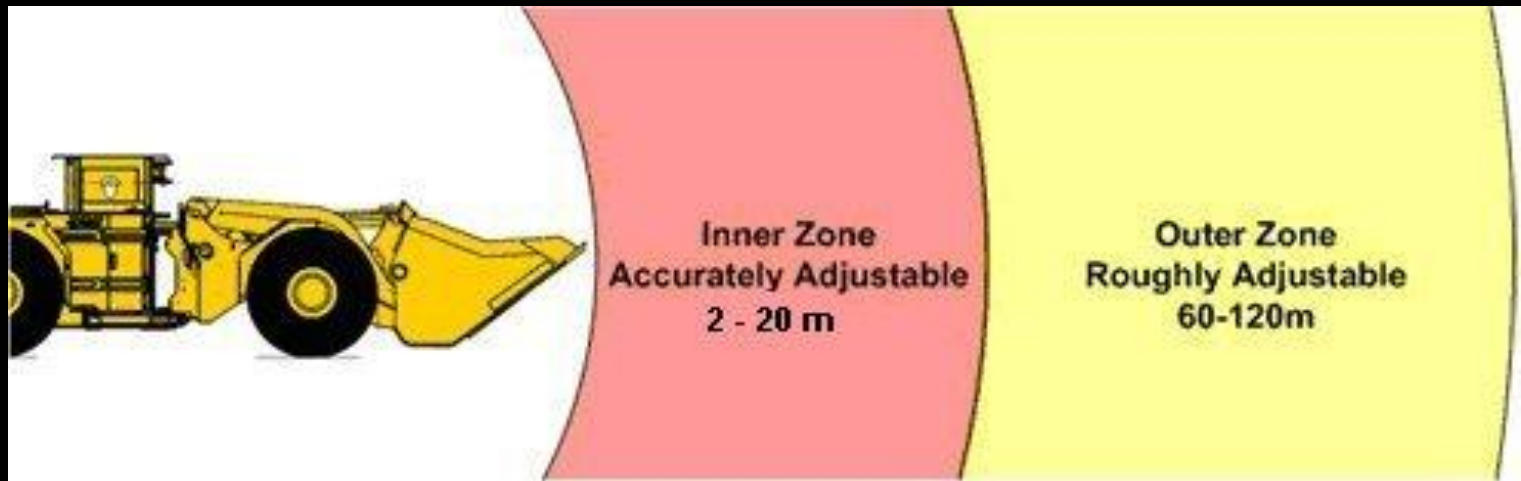


# Conclusion

MST Proximity Detection systems have shown that they can be an additional control to standard safety procedures

Technology must be simple and reliable

The systems have resulted in behavioural change of personnel which has resulted in a heightened awareness of safety





# Thank You

The logo for Mine Site Technologies, featuring a stylized orange and white graphic to the left of the text "MINE SITE TECHNOLOGIES" in a bold, sans-serif font.

**MINE SITE**  
TECHNOLOGIES

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