# Management of a large scale pit wall failure at Ernest Henry Mine

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## Outline

- **Brief introduction to EHM**
- **Development of Failure**
- **Keys to Successful Management**
- **Monitoring**
- **Communication**
- **Conclusion**
- **Summary**
- **Questions**

## Introduction


## Introduction

- **EHM is a open cut copper gold mine**
- **Mining began in 1996**
- **The pit is 1.2km x 1.53km**
- **The planned pit depth is 530m**
- **Current depth is 368m**
- **Mine approximately 11Mt ore and 50Mt waste per year**
- **Planned to finish mining in 2010**

## Failure Development

**October 2005**
- Possible movement

**November 2005**
- Investigation
- Monitoring
- Present information

**December 2005**
- Wall failure at 11.10pm on 17th

## Failure Development

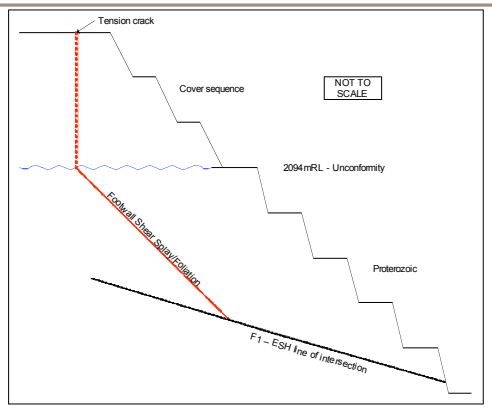
**December 2005 onwards**
- Wall failure at 11.10pm on 17th
- Mining continues
- Movement responses
- Deal with the wet season

**March 2006**
- Second failure on the 23rd

**Today and going forward…**
- Successfully mined to pit design
- Continued monitoring

## Failure Development


## Cross Section



## Keys to Success

**1. Good Monitoring System**

## Monitoring

**Monitoring consisted of:**

- Automated Prism Monitoring
- Slope Stability Radar
- Displacement Extensometer
- Visual monitoring

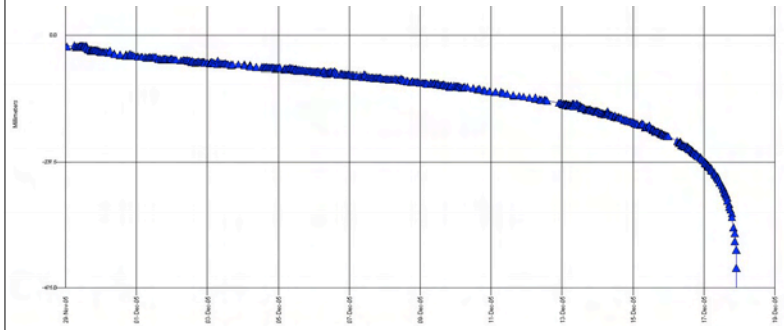
## Monitoring

**Prism System**

- 15 prisms
- 24 hour
- No alarm system
- Monitored by personnel

## Monitoring

## Monitoring



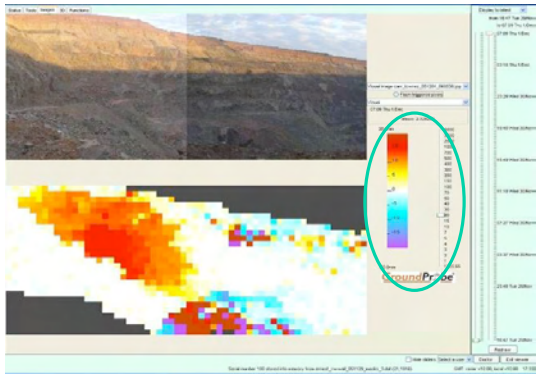
## Monitoring

**Slope Stability Radar – Ground Probe**

- Check limits
- Validate prism data
- Real time monitoring

## Monitoring

## Monitoring



## Monitoring

**Displacement Extensometer**

- Visual alarm
- Real time monitoring
- 24hr call-outs for geotechnical staff

## Monitoring


## Monitoring

**Visual Monitoring**

- Geotechnical inspections
- Photographs
- Spotter

## Keys to Success

1. Good Monitoring System
2. **Flexible Mining Schedule**
3. **Communication and Education.**

## Communication

1. **Daily information to supervisors**
2. **Weekly movement information to crews**
3. **Presentations and discussion sessions**
4. **Individual**
5. **Job Safety Analyses and Risk Assessment**
6. **Bi-weekly company newsletter**
7. **Monitoring system training**
8. **Two way communication**

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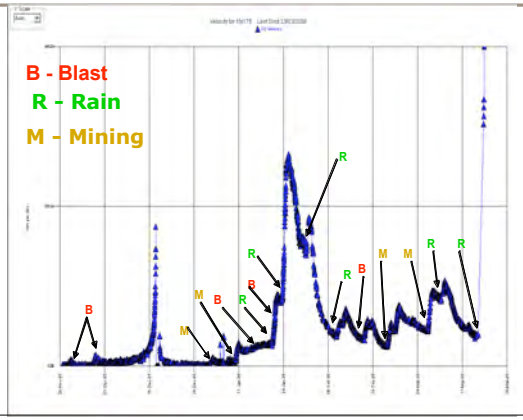


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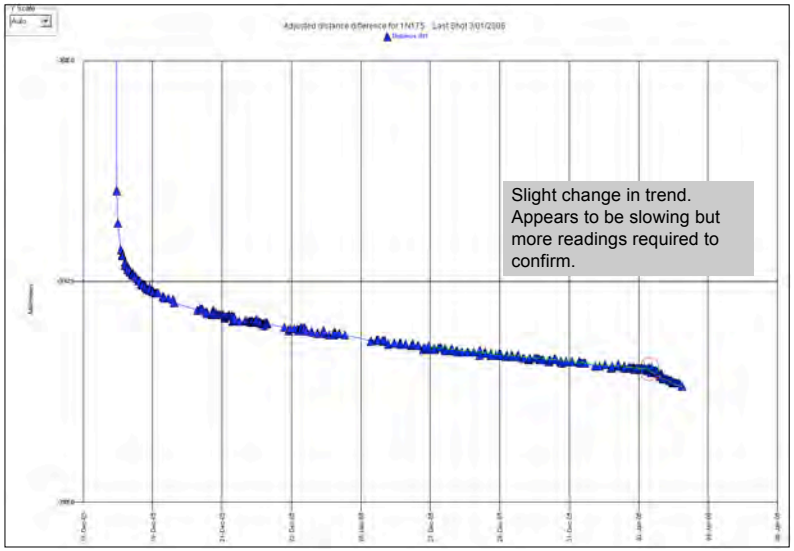


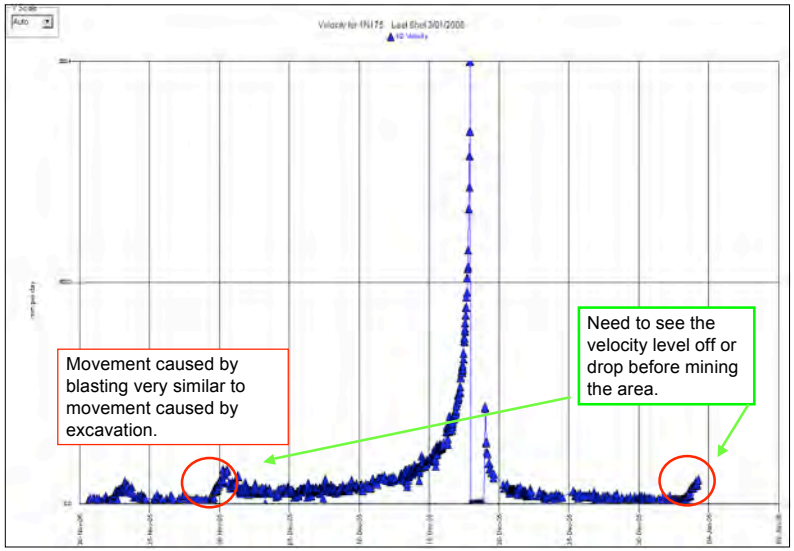


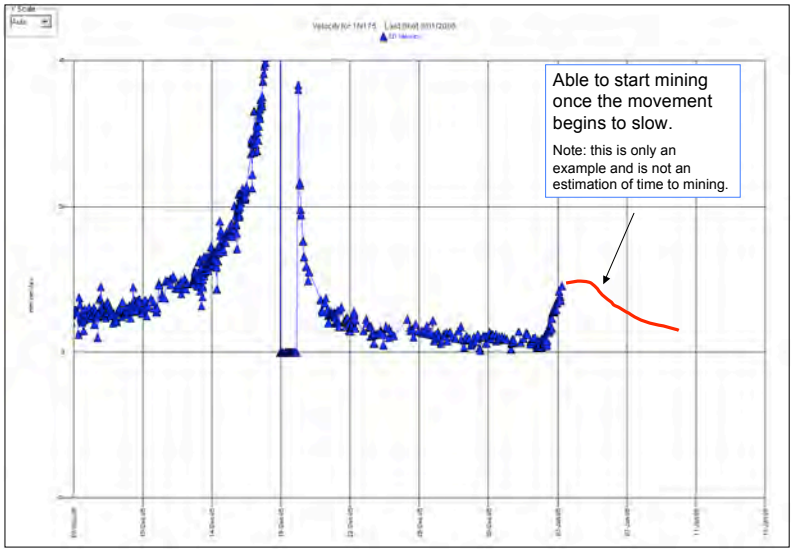


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## Communication

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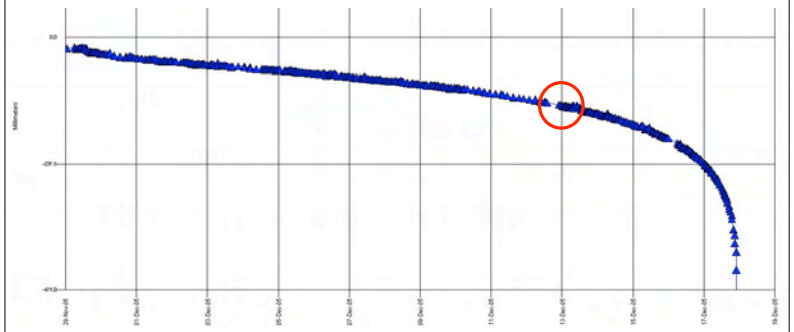
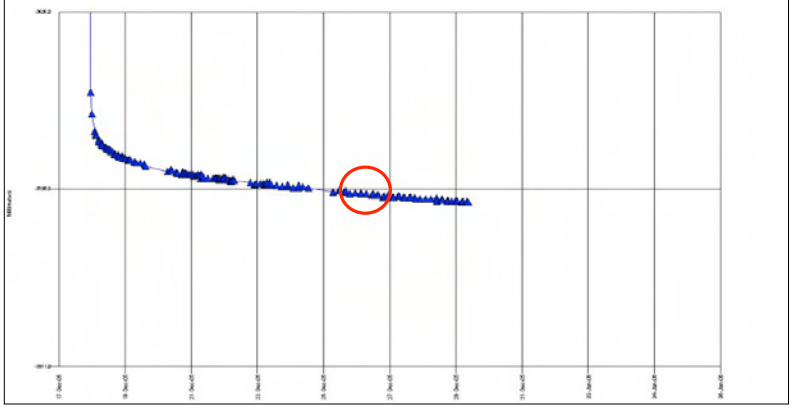
**And another…**

## Prism 175 accelerates to failure.



## Prism 175 now



## What's Changed and how we move forward.

### FACTS

Before First Failure (up to 18th December 2005)

- Higher than normal prism movements.
- Unsure of outcome, large amount of stored energy.
- Understood instability mechanism

After First Failure (up to 23rd March 2006)

- Risk of sudden collapse highly unlikely without external influence (rain, blasting).
- Stored energy reduced.
- Failure mechanism proven.

After Second Failure

- Result of 190mm in 48hrs of rain destabilising failed material.
- Stored energy further reduced.
- Material at much lower angle of repose.

### APPROACH

Before First Failure

- Take no chances.
- Restrict access.
- Intensified monitoring.

After First Failure

- Mine to monitoring.
- No incidents.
- Managed with prism monitoring system.

After Second Failure

- Mine as a large muck pile (broken dirt).
- Remove material that is not supporting rill.
- Manage removal of final material with the aid of Radar Monitoring.

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## Communication

**Persons involved in JSA:**

- Managers (GM, area managers)
- Superintendents
- Supervisors
- Geotechnical staff
- Safety officer
- Crew safety reps
- **Crew members**
  - **Drillers, digger operators, truck drivers**

**Importance of feedback!!**

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## Conclusion

- **Management strategy allowed successful and safe mining.**
- **Based on monitoring, flexibility and communication.**
- **Feedback and involvement of mining crews was important.**
- **Developing an understanding and trust through providing accurate timely information**

## Summary

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## Questions??

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