

GOLD FIELDS



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DRIEFONTEIN GOLD MINE

Safety Seminar

Pillar Steelwork – Ground Movement

YaRona Shaft (4#)

24 July 2008

Presented by : Wayne Allen

Overview of presentation



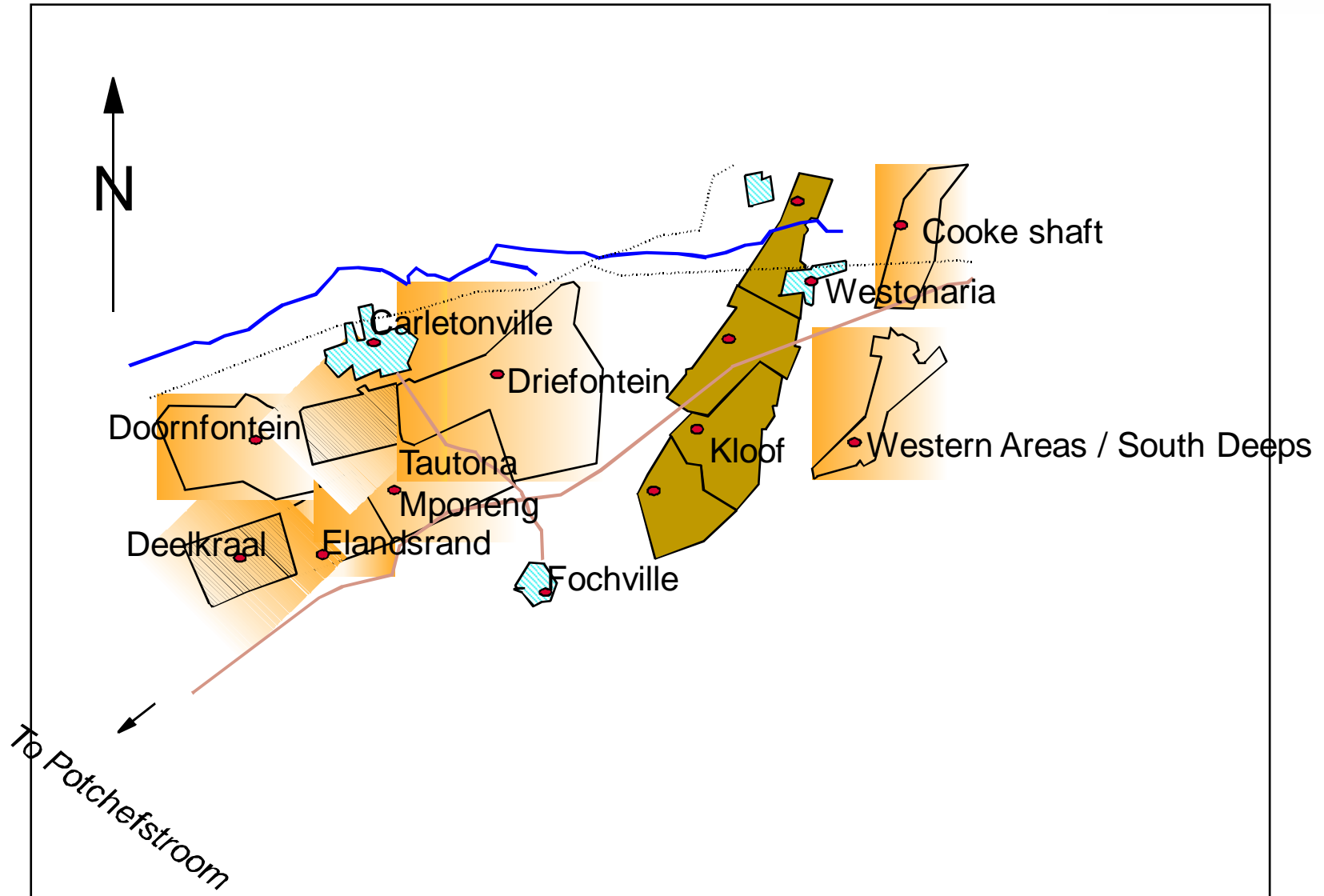
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- ❑ Locality Plan
- ❑ Shaft Infrastructure
- ❑ General Overview of Pillar
- ❑ Background of the Pillar
- ❑ Description of the Incident and findings
- ❑ Existing controls
- ❑ Remedial action
- ❑ Conclusion

Locality Plan



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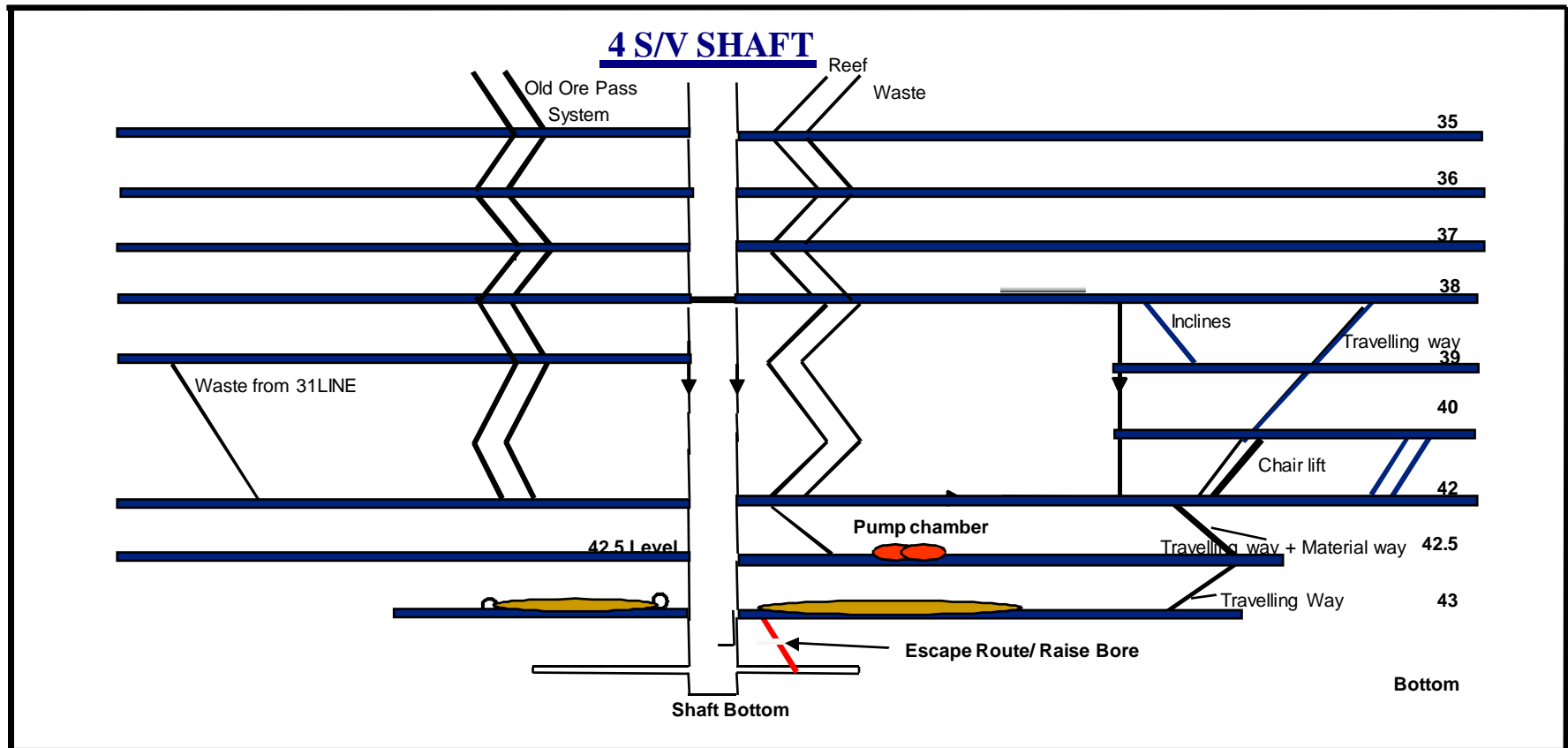


Shaft Infrastructure on the sub shaft



- ❑ The Sub Vertical Shafts is 3112m B.D
- ❑ Main services supplied mainly from surface (Air, water, power, etc) however air ring feed, water and power from neighboring shafts
- ❑ Sub shaft consist of 10 working levels
- ❑ Sub shaft consist of a BMR and 2 Man winders
- ❑ Do rock hoisting on sub shaft and get X-trammed to Pitseng (2#)

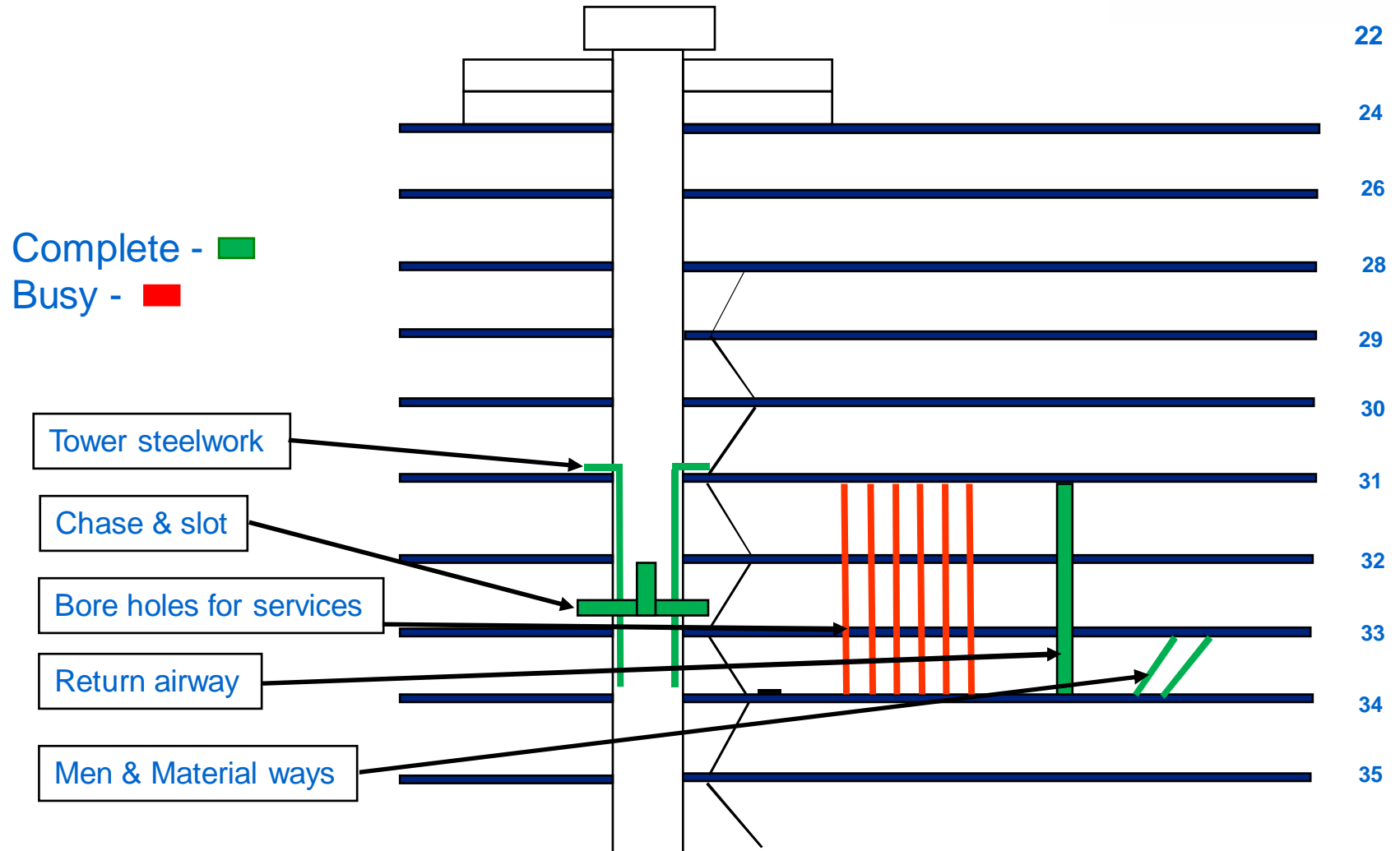
Shaft Infrastructure ore flow



General overview of Pillar



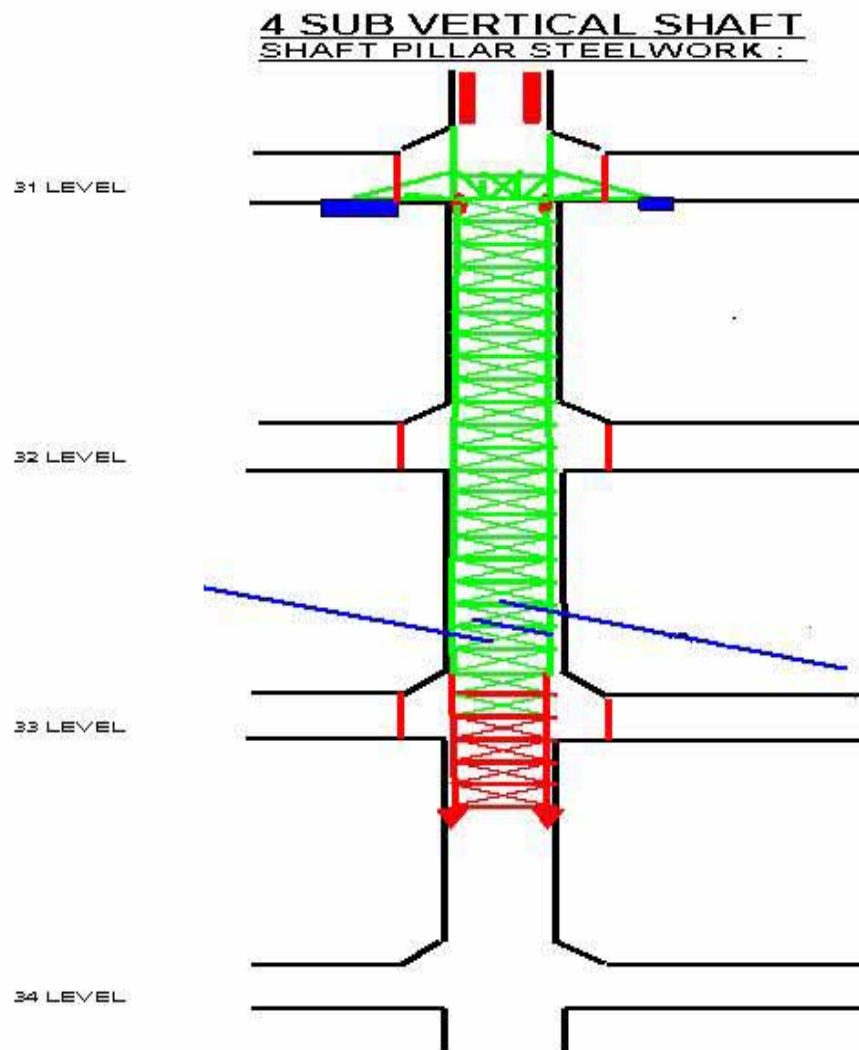
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General overview of Pillar



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Background of the Pillar

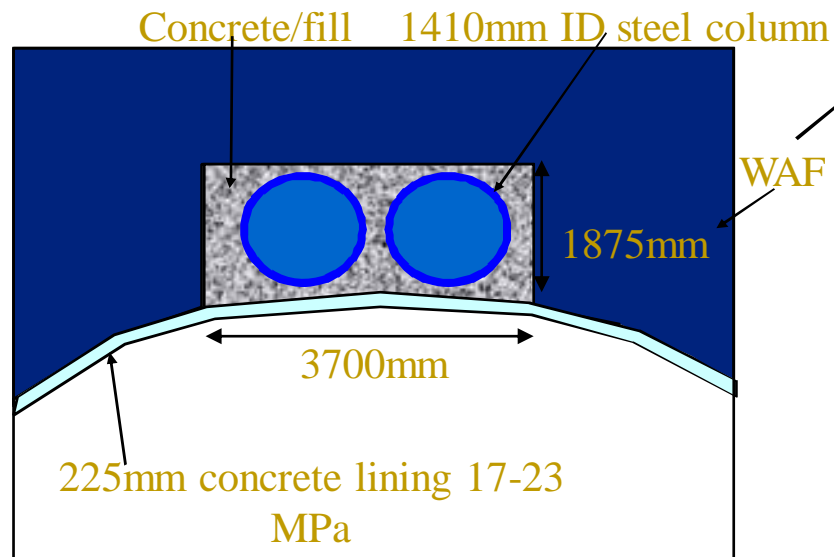


- ❑ Installation of the tower
- ❑ Reef intersect the shaft at 26m below 32 level
- ❑ Raise developed between 32 and 33 level
- ❑ Originally planned to open the slot around the shaft from the raise
- ❑ Shaft barrel concrete fell out due to side wall pressures on the east side of the shaft
- ❑ Imposing danger to shaft
- ❑ Decide to mine the chase

Background of the Pillar (chase)



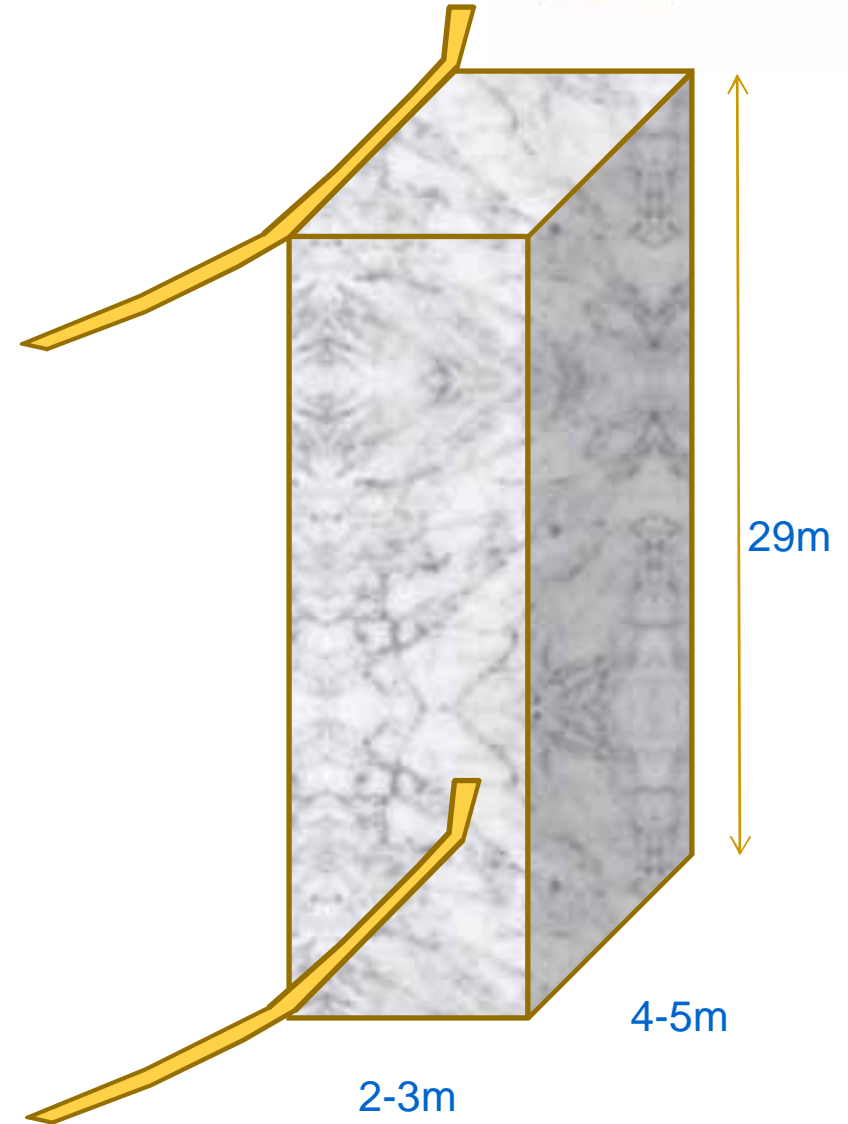
Highest probability of failure lies in the hangingwall of the reef up to 18m from top reef contact on the chase side of the barrel



Background of the Pillar (chase)



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Background of the Pillar



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Background of the Pillar (chase)



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Description of the Incident and findings



- ❑ Incident reported on the sub shaft the 11 April 2008
- ❑ With shaft examination, found counter weight on the west side rubbing against the guides
- ❑ Morning shift was hoisted with the east side conveyance
- ❑ Investigation team went down afternoon shift and found guide gauge measurements between 901 and 910mm (Standard size 940)
- ❑ Found side wall pressure on the west side caused sidewall movement
- ❑ Found pipe dividers still in tact with the shaft barrel between 31 and 32 levels on the west side (Preventing tower from hanging free)
- ❑ Found spear guides on the west side closer to 32L compared to the east side

Description of the Incident and findings



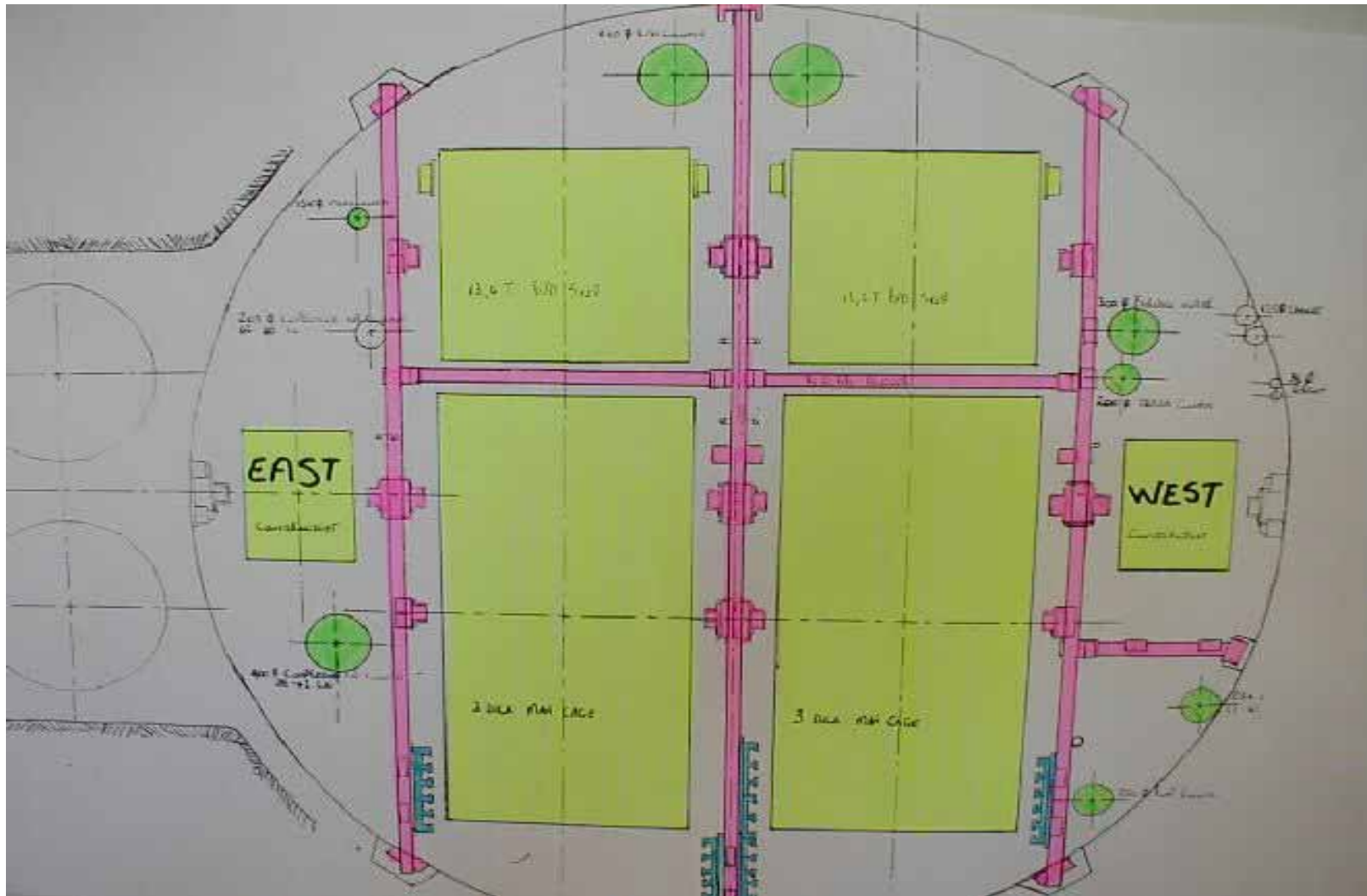
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Description of the Incident and findings



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Existing controls



- ❑ Lasers, measuring across the shaft at 2 points
- ❑ LVDT ground movement measuring instruments, measuring the horizontal stresses
- ❑ Vertical pull wires measuring vertical movement in the shaft
- ❑ Guide gauge weekly, findings in shaft logbook
- ❑ Measuring the compensating guide distances

Existing controls



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Remedial action



Afternoon shift 11 April

- ❑ Loosen guide brackets bolted onto cleat and jack guides to standard size of 940mm

Week-end of 12-13 April

- ❑ Move the spear guide on the west side closer to 31 level
- ❑ Took 4 guides out against the side wall below 32 level

Week-end of 19-20 April

- ❑ Pipe dividers between 31 and 32 levels was removed
- ❑ Plumb wires were installed between 31 and 34 levels measuring between the steel work and side wall

Future

- ❑ Diamond drill hole to locate position of orepass to the chase excavation on 32 level
- ❑ Additional support to be installed in the walkway brow on 32 level
- ❑ All engineering services and logistics will be moved to 31 and 33 levels
- ❑ New ore path in sections complete, development is in progress (internal system)
- ❑ Continuous examination, repairs and make safe in and around 32 level

Conclusion



- ❑ Live of shaft, 20 years
- ❑ Shaft grade between 12 and 13g/ton (High grade shaft)
- ❑ Sub shaft to stay in tact as long as possible
- ❑ Contingency plan still to be completed (End 2009/Mid 2010)
- ❑ Contingency make provision to access to sub shaft from neighboring shafts
- ❑ Special care and attention to pillar mining (Safety)

Shaft safety is not negotiable