KING&WOOD MALLESONS

Level 50
Bourke Place
600 Bourke Street
Melbourne VIC 3000
Australia

T +61 3 9643 4000
F +61 3 9643 5999

www.kwm.com

3 June 2014

Emily Heffernan
Senior Associate
T: + 61 3 9643 4208

Chris Fox
Partner
T: + 61 3 9643 4116

Justine Stansen
Principal Legal Advisor
Hazelwood Mine Fire Inquiry
Ground Level
1 Spring Street
Melbourne 3000

By email

Dear Madam

Hazelwood Mine Fire Inquiry

During the course of the hearing on 28 May 2014, Rob Dugan was asked questions about recommendation 6 as contained in the report into the fire in September 2008 in the southern batters of the Mine which was caused by the flare up of a pre-existing geological hotspot.[1] A copy of the September 2008 Mine Fire Report is at Annexure 6 to Mr Dugan's statement.

Recommendation 6 was as follows:

> ***Recommendation 6***
>
> - ***A risk assessment should be undertaken the non-operational areas to determine if further prevention work is required. The risk assessment should include a Cost/Benefit Analysis.***
>
> *A range of options have been identified in terms of prevention of hot spots from reigniting and detection of hotspots.*

In your letter dated 2 June 2014 you raised (in paragraph 10 of the Attachment) Recommendation 10 as contained in the September 2008 Mine Fire Report. Recommendation 10 was as follows:

[1] TR397-398

Recommendation 10

- ***Pre-existing geological hot spots need to be better monitored***

  The source of the September 2008 fire was very likely to be a pre-existing geological hotspot. The location is in the same area as the fire in December 2005, which was extensively covered in clay. Better monitoring processes need to be developed. Hot spots in non-operational areas have an added complexity due to the difficulty in access.

  Monitoring should consider:

  - *Known potential Hot Spots within the Mine are to be identified & included as part of the weekly Batter Stability Monitoring program.*
  - *Records / history of hotspots*
  - *Remote monitoring devices such as Thermal Imaging*
  - *Local monitoring devices such visual inspection o buried temperature gauges (eg thermocouples)*

We will be writing to you separately about your letter dated 2 June 2014.

As regards recommendations 6 and 10 of the September 2008 Mine Fire Report, we are instructed as follows:

1. Our client has not been able to locate a risk assessment as contemplated by Recommendation 6. Our client, however, took the steps set out below.

2. On 10 December 2008 at the Mine Planning and Scheduling Meeting it was noted that:

   a. Romeo Prezioso was to prepare a register of known hotspots; and

   b. Duncan Orr was to include the registered fireholes on the weekly batter stability routine.

   The minutes of the Mine Planning and Scheduling Meeting on 10 December 2008 are attached.

3. On 18 December 2008, Mr Prezioso completed a map showing the known hotspots which was the pro forma for the reports completed by Duncan Orr referred to below. The date the pro forma was completed is stamped in the bottom left corner of each of the Monthly Hotspot Inspection Reports.

4. On 24 December 2008 at the Mine Planning and Scheduling Meeting it was noted that:

   a. Mr Prezioso had prepared a register of known hotspots; and

   b. Duncan Orr was to include the registered fireholes on the weekly batter stability routine.

   The minutes of the Mine Planning and Scheduling Meeting on 24 December 2008 are attached.

5. On 14 May 2009, Bill Walker sent through an Action Item from GDF Suez system called Paradigm II, which is a control document tracking system, stating:

> "*A risk assessment should be undertaken on the non-operational areas to determine if further prevention work is required*".
> Prezioso commented:
> *"An ongoing assessment of non operational faces is conducted through the mine planning & engineering section which is captured at 6 week intervals over summer and 12 week intervals for remainder of the year. This inspection report lists actions items required with a subsequent cost/benefit analysis developed for any required work."*

6. On the same date, Bill Walker sent through an Action Item stating:

> "*The annual audit of the fire system must include the fire system and access in non-operational areas."*
> Prezioso commented:
> "*Annual F/service updated to include a plan showing the mine access roads to operational and non operational areas which will [be] conducted & documented in an annual basis."*
>
> The Paradigm II Action Items dated 14 May 2009 are attached.

7. From about February 2009 to April 2013, Duncan Orr (and after he passed away about February 2013, Alex Chisholm) completed a Monthly Hotspot Inspection Report with respect to the known hotspots, as identified by Mr Prezioso.

   Examples of the Monthly Hotspot Inspection Reports between February 2009 and April 2013 are attached.

8. From about December 2012, Robert Dugan included the results of the monthly inspection of the "Fire Hot Spots status throughout the Mine" as part of the Fire Management Systems – Weekly Status "Rag Reports".

   Examples of the Rag reports dated 17 December 2012, 31 December 2012, 7 January 2013, 21 January 2013 and 9 December 2013 are attached.

   The Rag report for the week commencing 3 February 2014 is Annexure 13 to Mr Dugan's Statement.

9. In December 2009, GHD provided a draft Report for Major Mining Hazards Assessment in response to a request by our client. The report identified Mine Fires as such a risk including spontaneous combustion of reactive coal (p.12). In Appendix A, it identified visual hot spot monitoring as a control system for spontaneous combustion. [P.32/51]

   A copy of the report is attached.

10. The Major Mine Hazards Risk Assessments and Control Measures have been adopted and kept up-to-date. Attached is a Bow-tie diagram relating to Spontaneous Combustion dated 22 October 2012. As part of the Control Measures for hotspots under this Risk management Process, System Control 0303 is Visual Hot Spot Monitoring. The performance Elements of the Control Measure include Tri-weekly monitoring by the 1 x 7 crew and shift monitoring by the 2 x 12 operations crew.

    A copy of System Control 0303 is attached.

Yours faithfully

Mine Planning and Scheduling Meeting
10th December 2008 Weekly Meeting Minutes
0800 - 0930 hrs at Mine Conference Room 1a

Attendees:
Dave Maxwell, Terry McDonald, Rob Dugan, Richard Polmear, Bill Estrada, Ian Quail, Romeo Prezioso
Guests:
Apologies: Martin Raun,

1.0 COAL SUPPLY RELIABILITY & COAL QUALITY

1.1 Coal Supply Reliability –

100% CSR - 7 units outlook till 15/12 then 8 units

1.2 Coal Quality –

No complaints from Power Station on coal size, quality or tramp iron.
ACTION: Ian Quail to follow up P/Stn attendance to this meeting

2.0 O/B PRODUCTION PROGRESS

2.1 Production Stats

Period: 1/12 – 7/12	**Target**	**Actual**
Volume removed	14,000 m^3/day	19,525 or 2,790 m^3/day
Digging Time	57% @ 1,025 m^3/hr	47 % uptime
Dig Rate	65% @ 900 m^3/hr	~246 m^3/hr

2.2 Delay Stats

Major losses	**Min lost**	**Lessons to avoid further future losses**
Rate losses		Reduced rate due to 1 drive only on TS2 C/C till Xmas
D25		Side batter slip
D25		Really crap material

Regrade onto coal working well – need to watch for stability overheight

3.0 SCHEDULE REVIEW (7 days – 3 months)

TS2 limited dumping topside (4m high) M308 B/Shift delayed to nominally 16/12
ACTION: RD to consider RTL resources during Xmas for M520 formation

4.0 DIG RATES ACHIEVED FOR THE WEEK

Machine	Target Rate (t/hr)	Actual Rate (t/hr)	Reasons for variance
D25	900		
D10	1,750		
D9	1,600		
D11	1,750		

ACTION: RD to conduct dig test on D?? system

5.0 PLANNING INITIATIVES PROGRESS

5.1 Level 1 regrade progress

DM provided an update on regrade. Potential saving of 250k m^3 compared to original grading in 2009. This will create some problems for D10 operations with tail end O/H.

ACTION: DM to present regrade stage plans by 17/12.
ACTION: Jay to provide Dave Maxwell with 3D model of crap material.

5.2 SEF O/B dump alternatives

Klaus Haberler contracted to investigate TS2 critical components to operate on steep grades (>1 in 15) and WBM contracted for tripper review. Preliminary advice is that potential to operate at 1 in 15 – propose using 1 in 20 operating grades. Terry presented concept for extending dump. Realistically earthworks won't be done till after RRR - mid 2009. Need to develop detailed program for costing and implementation lead times.

ACTION: Richard to provide MMH and WBM reports when finalised
ACTION: Terry to have detailed survey pick up completed & peg alignment
ACTION: Romeo to develop plan for trackshift back 300 metres
ACTION: Richard to develop scope of works for costing and lead times

5.3 CS4 Coal recovery

6.0 PROJECTS UPDATE

6.1 Drainage

SEF Dump drains diverted to sector 8 from 0900 hours 3/12/08. Some sand for rubble drain construction delivered for installation next year.

ACTION: Romeo & Duncan for interim strategy for sufficient water in DW Pond
ACTION: Mick Heily to arrange 400 metres of sand in rubble drain by Xmas

6.2 Fire Service Mains

Activity	Progress
Level 1	North 80% complete, South 100% complete
Level 3	North 75% complete, South 100% complete 3-5 level south 750 dia dropper 90% complete (waiting cut-over)
Level 5	North 100% complete, South 100% complete
Level 7	No North extension, South 100% complete
Other	Ring main diversion complete, recovery 100%, painting 100%

6.3 GPS

D11 and D10 successfully operating on GPS only (D10 from 17/11). Wiring complete on all machines, except D24. D9 and D25 survey field work complete. Still aim to have all machines operating on GPS by end 2008.

6.4 Northern Batter Access Ramps Construction

3-5 level ramp clay covered with rock before year end.

6.5 Northern Batters Firehole Excavation

Clay backfill completed – inspected and considered satisfactory by Rob D.

ACTION: Romeo to prepare register of known fireholes
ACTION: Duncan to include registered fireholes on weekly batter stability inspection routine

7.0 GRADE CONTROL ISSUES

ACTION: Some BOC drilling on M820 remains (to be completed early 2009).

8.0 OTHERS

Change of perimeter road to include Brodribb Road in next few days. This will allow self draining of stability surcharge areas through to M520 operating face by Xmas.

Meeting finished at 0930 hours Next Meeting 0800 hours 17th December 2008

Mine Planning and Scheduling Meeting
24th December 2008 Weekly Meeting Minutes
0900 - 1000 hrs at Mine Conference Room 1a

Attendees:
Dave Maxwell, Rob Dugan, Richard Polmear, Bill Estrada, Ian Quail, Terry McDonald,
Guests:
Apologies: Romeo Prezioso, Martin Raun,

1.0 COAL SUPPLY RELIABILITY & COAL QUALITY

1.1 Coal Supply Reliability –

100% CSR - 8 units till 2/1/09

1.2 Coal Quality –

A complaint received from Power Station on too much water from spraying on a recent hot day. No other complaints about coal size, quality or tramp iron.
ACTION: Ian Quail to follow up P/Stn attendance to this meeting
ACTION: Terry McDonald to map sticky coal when noted
ACTION: Rob Dugan to ensure Shift Manager notifies Power Station when spraying is occurring.

2.0 O/B PRODUCTION PROGRESS

2.1 Production Stats

Period: 15/12 – 21/12	**Target**	**Actual**
Volume removed	14,000 m^3/day	82,000 or 11,700 m^3/day
Digging Time	57% @ 1,025 m^3/hr	51 % uptime
Dig Rate	65% @ 900 m^3/hr	~686 m^3/hr

2.2 Delay Stats

Major losses	**Min lost**	**Lessons to avoid further future losses**
Rate losses		Reduced rate due to 1 drive only on TS2 C/C till 18/12

Regrade onto coal working well –

3.0 SCHEDULE REVIEW (7 days – 3 months)

D25 dig out today the D24 bottomside till M520 B/Shift on 30/12.

4.0 DIG RATES ACHIEVED FOR THE WEEK

Machine	Target Rate (t/hr)	Actual Rate (t/hr)	Reasons for variance
D25	900		
D10	1,750		
D9	1,600		
D11	1,750		

ACTION: RD to conduct dig test on D?? system

5.0 PLANNING INITIATIVES PROGRESS

5.1 Level 1 regrade progress

DM provided an update on regrade. Potential saving of 250k m^3 compared to original grading in 2009. This will create some problems for D10 operations with tail end O/H. About 15-20,000m3 truck and shovel for M540 tail end gullet needed in Jan/Feb. Drainage problems and solutions for MWW discussed.

ACTION: DM to present regrade stage plans by 7/1.
ACTION: Jay to provide Dave Maxwell with 3D model of crap material.
ACTION: RMP to provide directions to RTL about work priorities in Jan

5.2 SEF O/B dump alternatives

MMH and WBM reports on TS2 and Tripper to operate on 1 in 20 grade have been received and are with Maintenance for review. Realistically earthworks won't be done till after RRR - mid 2009. Need to develop detailed program for costing and implementation lead times.

ACTION: Richard to provide MMH and WBM reports to Bill E
DONE: Terry to have detailed survey pick up completed & peg alignment
ACTION: Romeo to develop plan for trackshift back 300 metres
ACTION: Martin to develop scope of works for costing and lead times
ACTION: Meeting to review project in late Jan 2009

5.3 CS4 Coal recovery

6.0 PROJECTS UPDATE

6.1 Drainage

SEF Dump drains diverted to sector 8 from 0900 hours 3/12/08. Some sand for rubble drain construction delivered.

DONE: Mick Heily to arrange 400 metres of sand in rubble drain by Xmas

6.2 Fire Service Mains

Activity	**Progress – All mechanical works complete only minor painting touch ups required**
Level 1	North 95% (cut-over complete), South 100% complete
Level 3	North 95% (cut-over complete), South 100% complete 3-5 level south 750 dia dropper 95% complete (cut-over complete)
Level 5	North 100% complete, South 100% complete
Level 7	No North extension, South 100% complete
Other	Ring main diversion complete, recovery 100%, painting 100%

6.3 GPS

D11 and D10 successfully operating on GPS only (D10 from 17/11). Wiring complete on all machines, except D24. D9 and D25 survey field work complete. Still aim to have all machines operating on GPS by end 2008.

ACTION: Some driver complaints – RD to follow up SDargan

6.4 Northern Batters Firehole Excavation

DONE: Romeo to prepare register of known fireholes

DONE: Duncan to include registered fireholes on weekly batter stability inspection routine

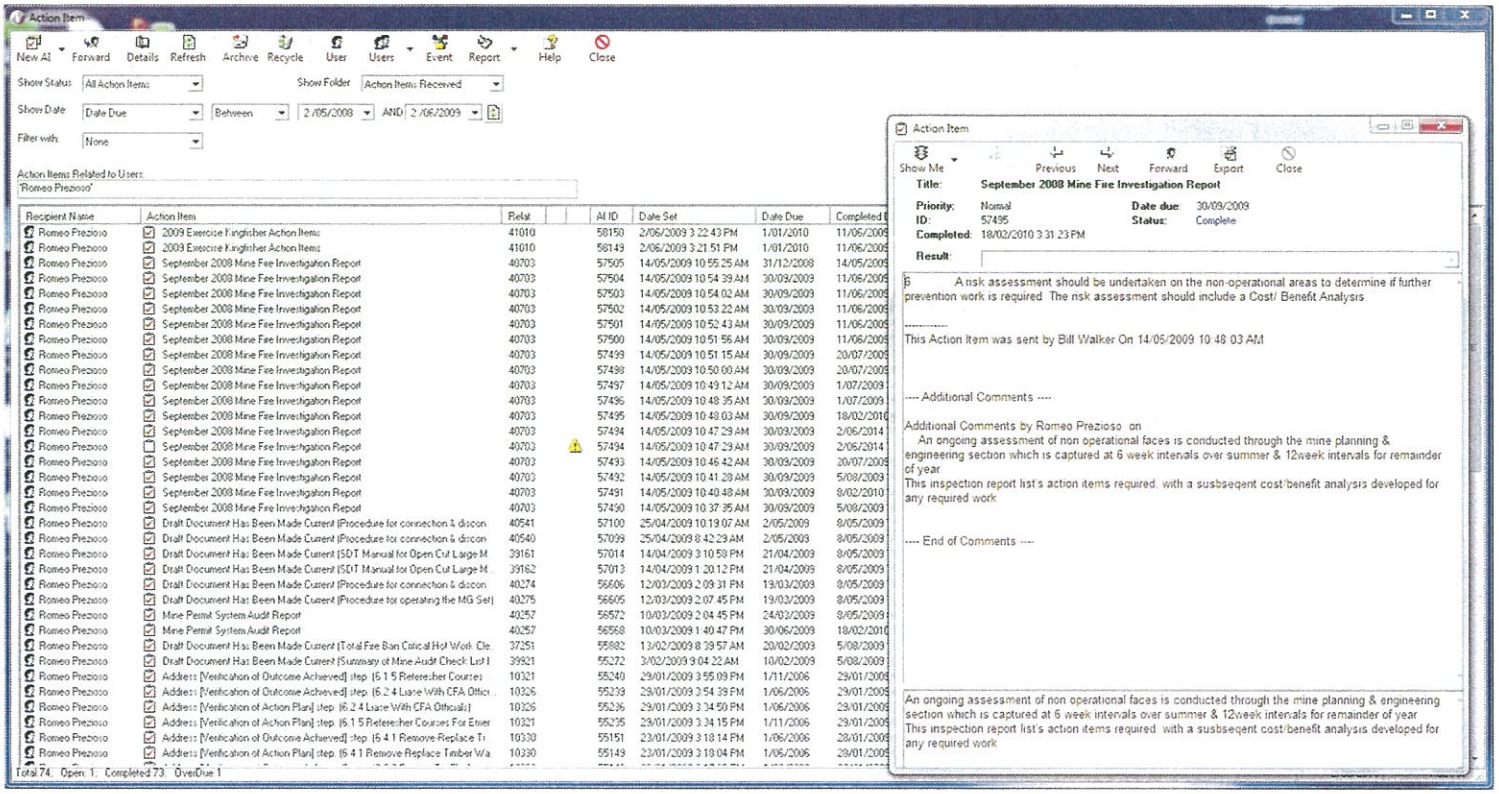
7.0 GRADE CONTROL ISSUES

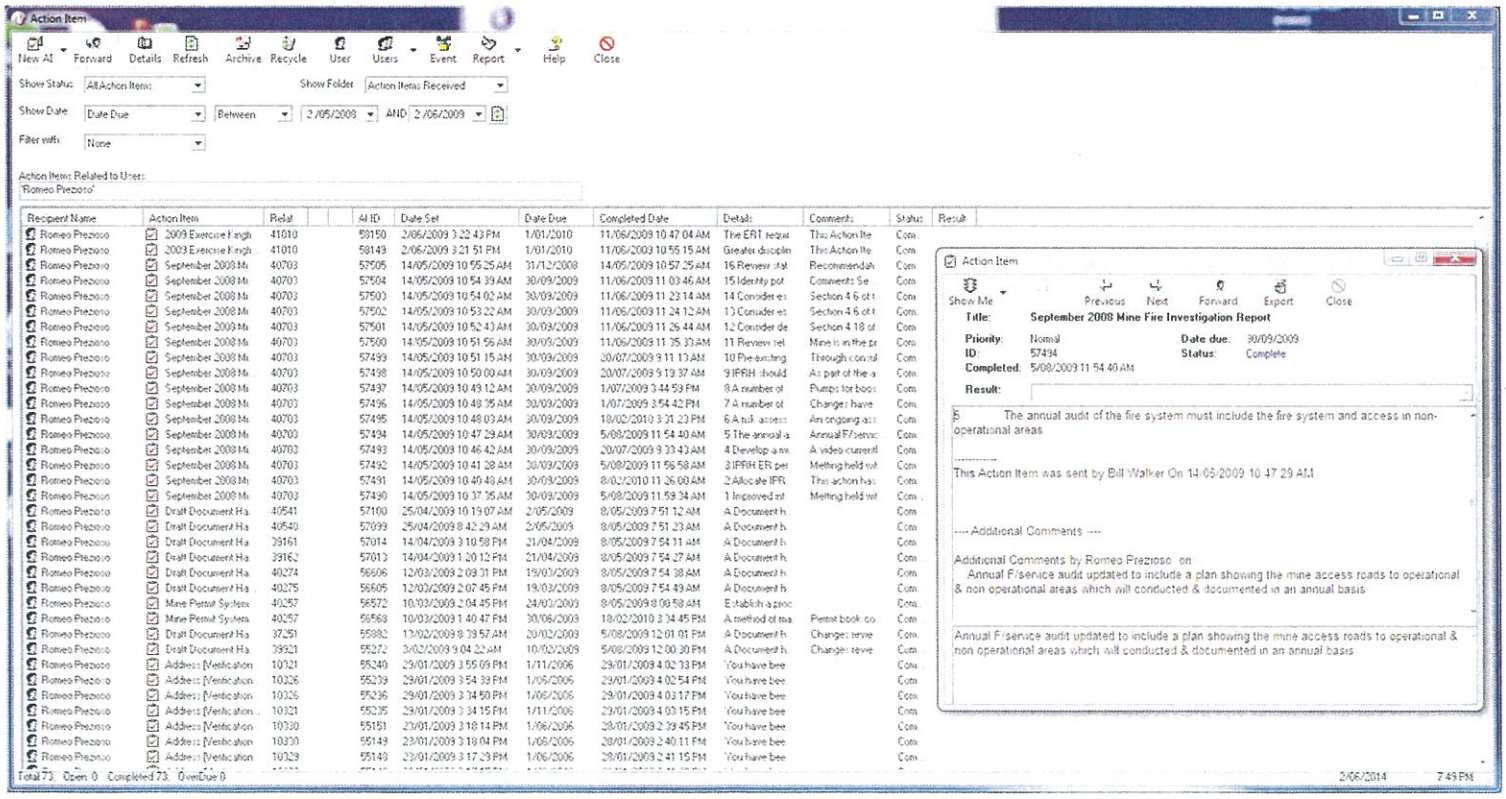
ACTION: Some BOC drilling on M820 remains (to be completed early 2009).
ACTION: Romeo to supply previous drawing to Terry for establishing drainage arrangements when digging below M820
ACTION: Terry to update plans supplied by Romeo

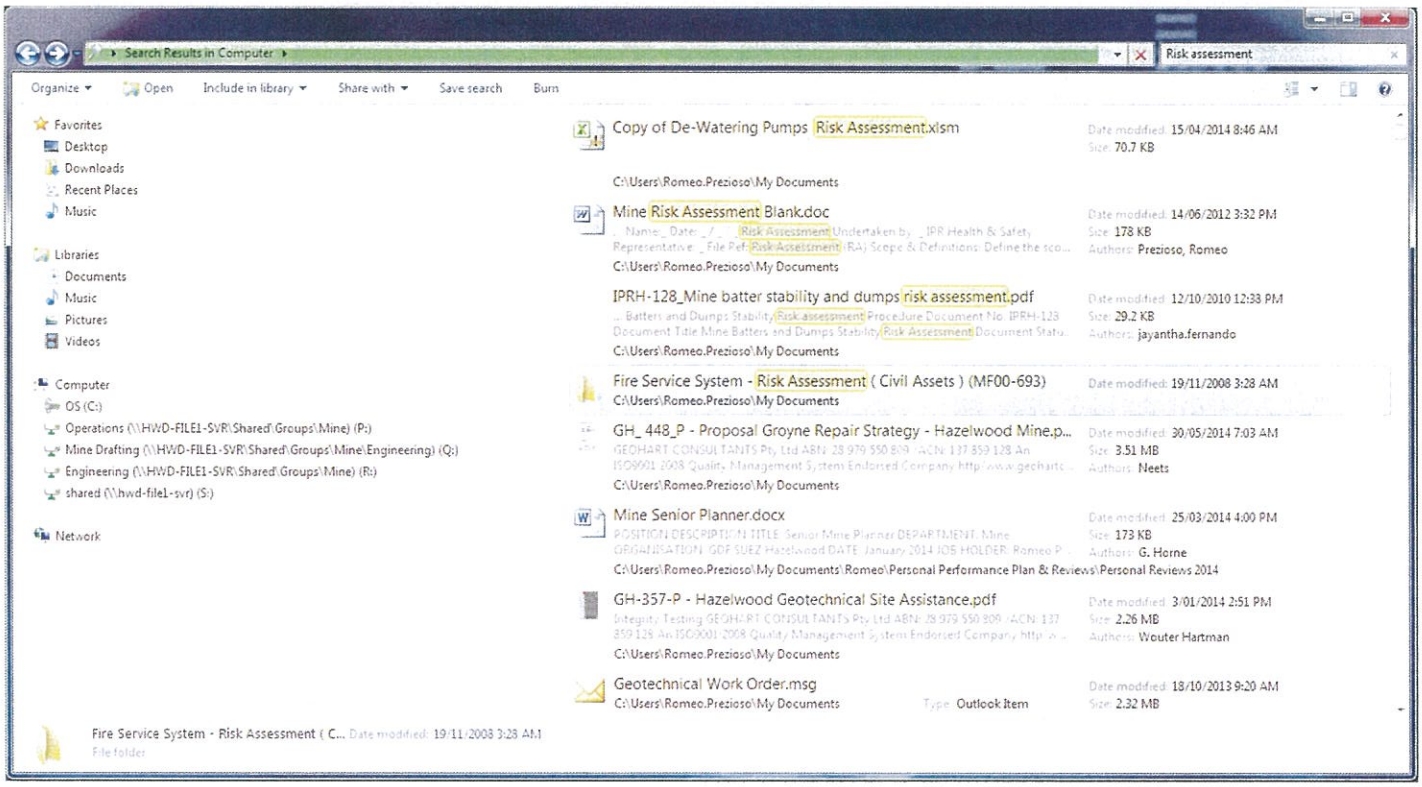
8.0 OTHERS

Nil

Meeting finished at 0945 hours Next Meeting 0800 hours 7th January 2009


Action Item
New AI
Forward
Details
Refresh
Archive
Recycle
User
Users
Event
Report
Help
Close
Show Status: All Action Items
Show Folder: Action Items Received
Show Date: Date Due
Between
2/05/2008
AND 2/06/2009
Filter with: None
Action Items Related to Users:
'Romeo Prezioso'
Recipient Name
Action Item
Relat
AI ID
Date Set
Date Due
Completed
Romeo Prezioso
2009 Exercise Kingfisher Action Items
September 2008 Mine Fire Investigation Report
Draft Document Has Been Made Current (Procedure for connection & discon
Draft Document Has Been Made Current (SDT Manual for Open Cut Large M
Mine Permit System Audit Report
Draft Document Has Been Made Current (Total Fire Ban Critical Hot Work Cle
Draft Document Has Been Made Current (Summary of Mine Audit Check List I
Address [Verification of Outcome Achieved] step. (6.1.5 Retereicher Courses)
Address [Verification of Outcome Achieved] step. (6.2.4 Liaise With CFA Offici
Address [Verification of Action Plan] step. (6.2.4 Liaise With CFA Officials)
Address [Verification of Action Plan] step. (6.1.5 Retereicher Courses For Emer
Address [Verification of Outcome Achieved] step. (6.4.1 Remove-Replace Tr
Address [Verification of Action Plan] step. (6.4.1 Remove-Replace Timber Wa
Total 74; Open 1; Completed 73; OverDue 1
Action Item
Show Me
Previous
Next
Forward
Export
Close
Title: September 2008 Mine Fire Investigation Report
Priority: Normal
ID: 57495
Completed: 18/02/2010 3:31:23 PM
Date due: 30/09/2009
Status: Complete
Result:
6 A risk assessment should be undertaken on the non-operational areas to determine if further prevention work is required The risk assessment should include a Cost/ Benefit Analysis
This Action Item was sent by Bill Walker On 14/05/2009 10:48:03 AM
---- Additional Comments ----
Additional Comments by Romeo Prezioso on
An ongoing assessment of non operational faces is conducted through the mine planning & engineering section which is captured at 6 week intervals over summer & 12week intervals for remainder of year
This inspection report list's action items required. with a susbseqent cost/benefit analysis developed for any required work
---- End of Comments ----
An ongoing assessment of non operational faces is conducted through the mine planning & engineering section which is captured at 6 week intervals over summer & 12week intervals for remainder of year
This inspection report list's action items required. with a susbseqent cost/benefit analysis developed for any required work


Action Item
New AI
Forward
Details
Refresh
Archive
Recycle
User
Users
Event
Report
Help
Close
Show Status: All Action Items
Show Folder: Action Items Received
Show Date: Date Due
Between
2/05/2008
AND 2/06/2009
Filter with: None
Action Items Related to Users:
'Romeo Prezioso'
Recipient Name
Action Item
Relat
AI ID
Date Set
Date Due
Completed Date
Details
Comments
Status
Result
Total 73; Open 0; Completed 73; OverDue 0
2/06/2014
7:49 PM
Action Item
Show Me
Previous
Next
Forward
Export
Close
Title: September 2008 Mine Fire Investigation Report
Priority: Normal
ID: 57494
Completed: 5/08/2009 11:54:40 AM
Date due: 30/09/2009
Status: Complete
Result:
6 The annual audit of the fire system must include the fire system and access in non-operational areas
This Action Item was sent by Bill Walker On 14/05/2009 10:47:29 AM
---- Additional Comments ----
Additional Comments by Romeo Prezioso on
Annual F/service audit updated to include a plan showing the mine access roads to operational & non operational areas which will conducted & documented in an annual basis
Annual F/service audit updated to include a plan showing the mine access roads to operational & non operational areas which will conducted & documented in an annual basis

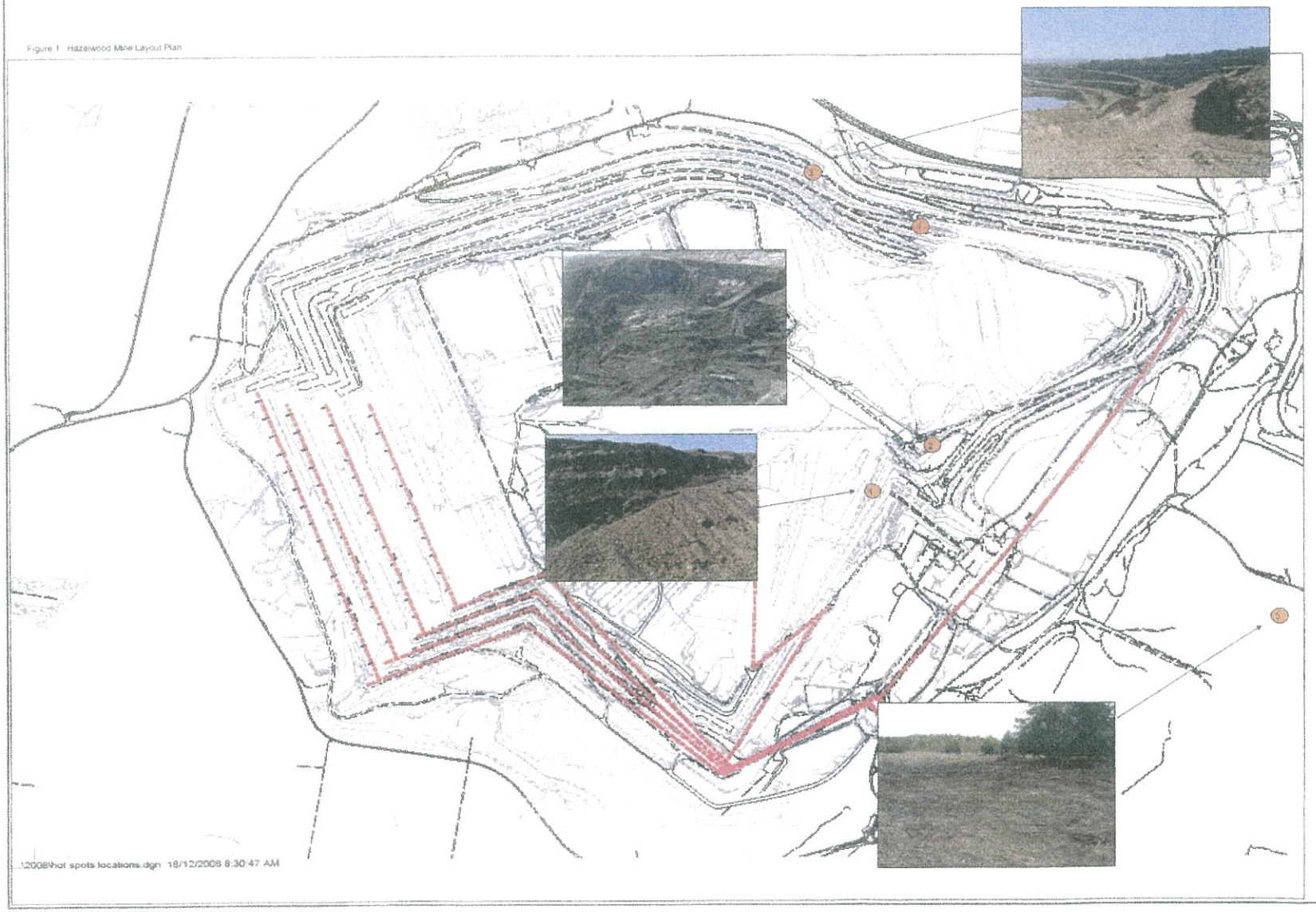

Search Results in Computer
Risk assessment
Organize
Open
Include in library
Share with
Save search
Burn
Favorites
Desktop
Downloads
Recent Places
Music
Libraries
Documents
Music
Pictures
Videos
Computer
OS (C:)
Operations (\\HWD-FILE1-SVR\Shared\Groups\Mine) (P:)
Mine Drafting (\\HWD-FILE1-SVR\Shared\Groups\Mine\Engineering) (Q:)
Engineering (\\HWD-FILE1-SVR\Shared\Groups\Mine) (R:)
shared (\\hwd-file1-svr) (S:)
Network
Copy of De-Watering Pumps Risk Assessment.xlsm
Date modified: 15/04/2014 8:46 AM
Size: 70.7 KB
C:\Users\Romeo.Prezioso\My Documents
Mine Risk Assessment Blank.doc
Date modified: 14/06/2012 3:32 PM
Size: 178 KB
Authors: Prezioso, Romeo
C:\Users\Romeo.Prezioso\My Documents
IPRH-128_Mine batter stability and dumps risk assessment.pdf
Date modified: 12/10/2010 12:33 PM
Size: 29.2 KB
Authors: jayantha.fernando
C:\Users\Romeo.Prezioso\My Documents
Fire Service System - Risk Assessment (Civil Assets) (MF00-693)
Date modified: 19/11/2008 3:28 AM
C:\Users\Romeo.Prezioso\My Documents
GH_ 448_P - Proposal Groyne Repair Strategy - Hazelwood Mine.p...
Date modified: 30/05/2014 7:03 AM
Size: 3.51 MB
Authors: Neets
C:\Users\Romeo.Prezioso\My Documents
Mine Senior Planner.docx
Date modified: 25/03/2014 4:00 PM
Size: 173 KB
Authors: G. Horne
C:\Users\Romeo.Prezioso\My Documents\Romeo\Personal Performance Plan & Reviews\Personal Reviews 2014
GH-357-P - Hazelwood Geotechnical Site Assistance.pdf
Date modified: 3/01/2014 2:51 PM
Size: 2.26 MB
Authors: Wouter Hartman
C:\Users\Romeo.Prezioso\My Documents
Geotechnical Work Order.msg
Date modified: 18/10/2013 9:20 AM
C:\Users\Romeo.Prezioso\My Documents
Type: Outlook Item
Size: 2.32 MB
Fire Service System - Risk Assessment (C... Date modified: 19/11/2008 3:28 AM
File folder

Hot Spot Inspection Report - February 2009

Mine Engineering
Ref: MF09-77, MD10/325
16th March 2010

Location		IDENTIFICATION OF PROBLEMS / PRESENT STATUS	REQUIRED ACTION / PURPOSE	ACTION REQUIRED By & PERSON RESPONSIBLE
Northern Batters 5 Level	1	No Hotspots noted - Inspected weekly thoughout Dec, Jan and Feb	N/A	
SEF 1 Level	2	No Hotspots noted - Inspected weekly thoughout Dec, Jan and Feb	N/A	
TP7 5 Level	3	No Hotspots noted - Inspected weekly thoughout Dec, Jan and Feb	N/A	
5 Level Northern Batters near HARE	4	No Hotspots noted - Inspected weekly thoughout Dec, Jan and Feb	N/A	
Eastern OB Dump	5	No Hotspots noted - Inspected weekly thoughout Dec, Jan and Feb	N/A	

Figure 1 Hazelwood Mine Layout Plan

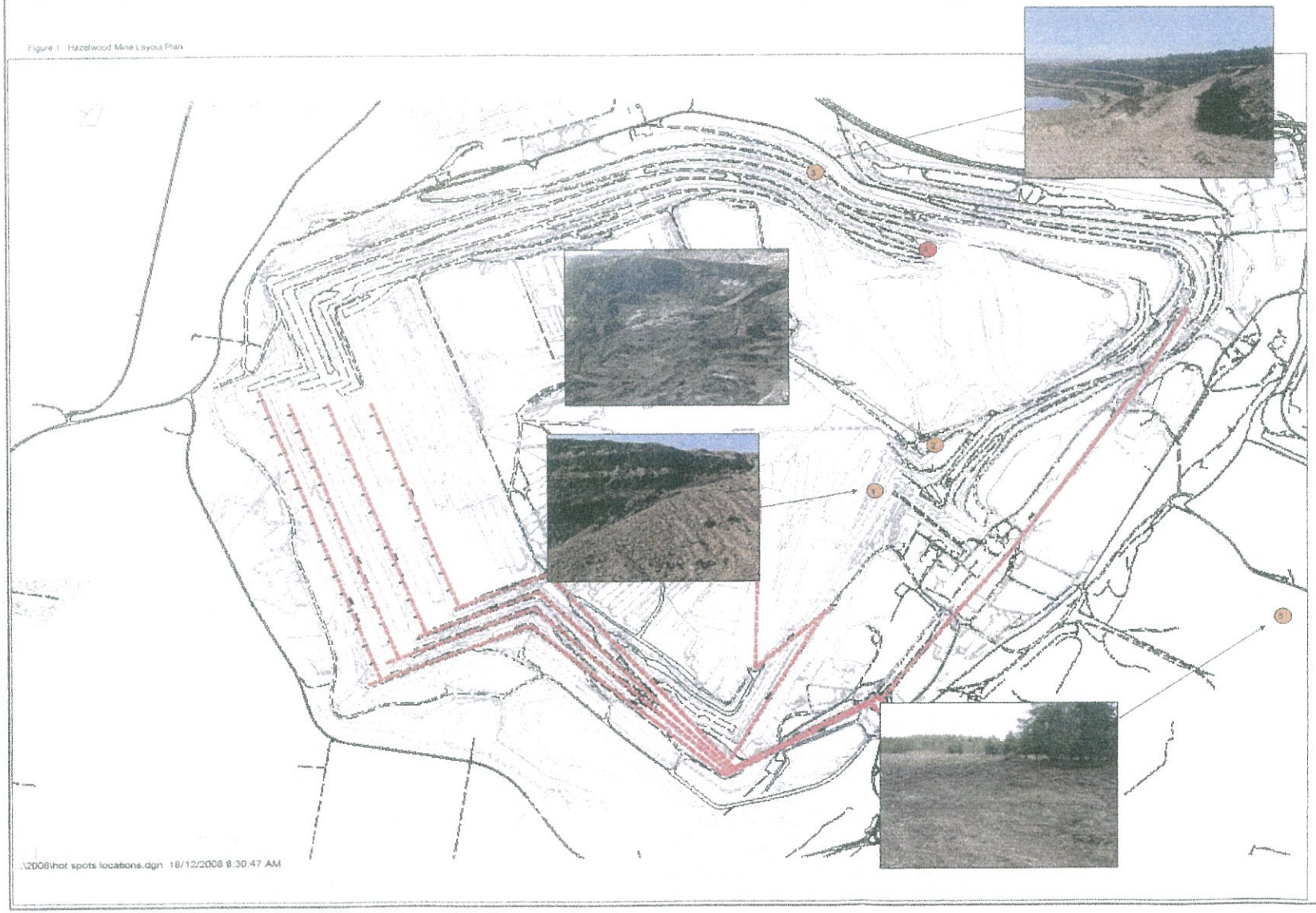


Hot Spot Inspection Report - April 2009

Mine Engineering
Ref: MF09-77/ MD10/772
30th April 2010

Location		IDENTIFICATION OF PROBLEMS / PRESENT STATUS	REQUIRED ACTION / PURPOSE	ACTION REQUIRED By & PERSON RESPONSIBLE
Northern Batters 5 Level	1	No Hotspots noted - Inspected weekly thoughout Mar and April	N/A	
SEF 1 Level	2	No Hotspots noted - Inspected weekly thoughout Mar and April	N/A	
TP7 5 Level	3	No Hotspots noted - Inspected weekly thoughout Mar and April	N/A	
5 Level Northern Batters near HARE	4	Hot spot found burning and smoking 9th April	Fire put out and covered in clay 9th April.	
Eastern OB Dump	5	No Hotspots noted - Inspected weekly thoughout Mar and April	N/A	

Figure 1 Hazelwood Mine Layout Plan

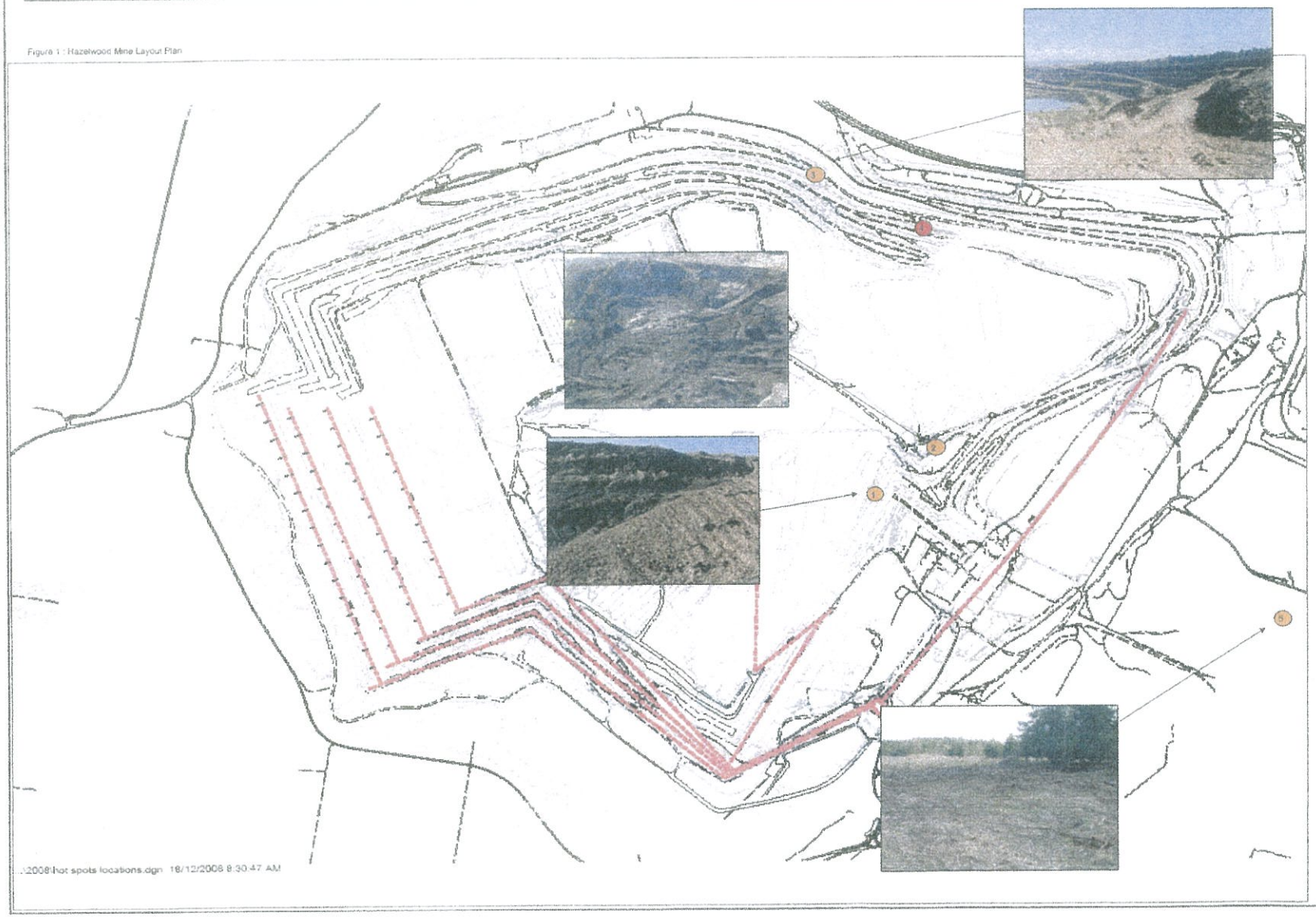


Monthly Hot Spot Inspection Report - May 2009

Mine Engineering
Ref MF09-77/ MD09/1103
5th June 2009

Location		IDENTIFICATION OF PROBLEMS / PRESENT STATUS	REQUIRED ACTION / PURPOSE	ACTION REQUIRED By & PERSON RESPONSIBLE
Northern Batters 5 Level	1	No Hotspots noted - 8/5/09; 18/5/09; 26/5/09		
SEF 1 Level	2	No Hotspots noted - 8/5/09; 18/5/09; 26/5/09		
TP7 5 Level	3	No Hotspots noted - 8/5/09; 18/5/09; 26/5/09		
5 Level Northern Batters near HARE	4	Steam rising from coal batter - 25/5/09	Doze material to 3:1 slope and clay cover	Romeo ASAP
Eastern OB Dump	5	No Hotspots noted - 8/5/09; 18/5/09; 26/5/09		

Figure 1 : Hazelwood Mine Layout Plan

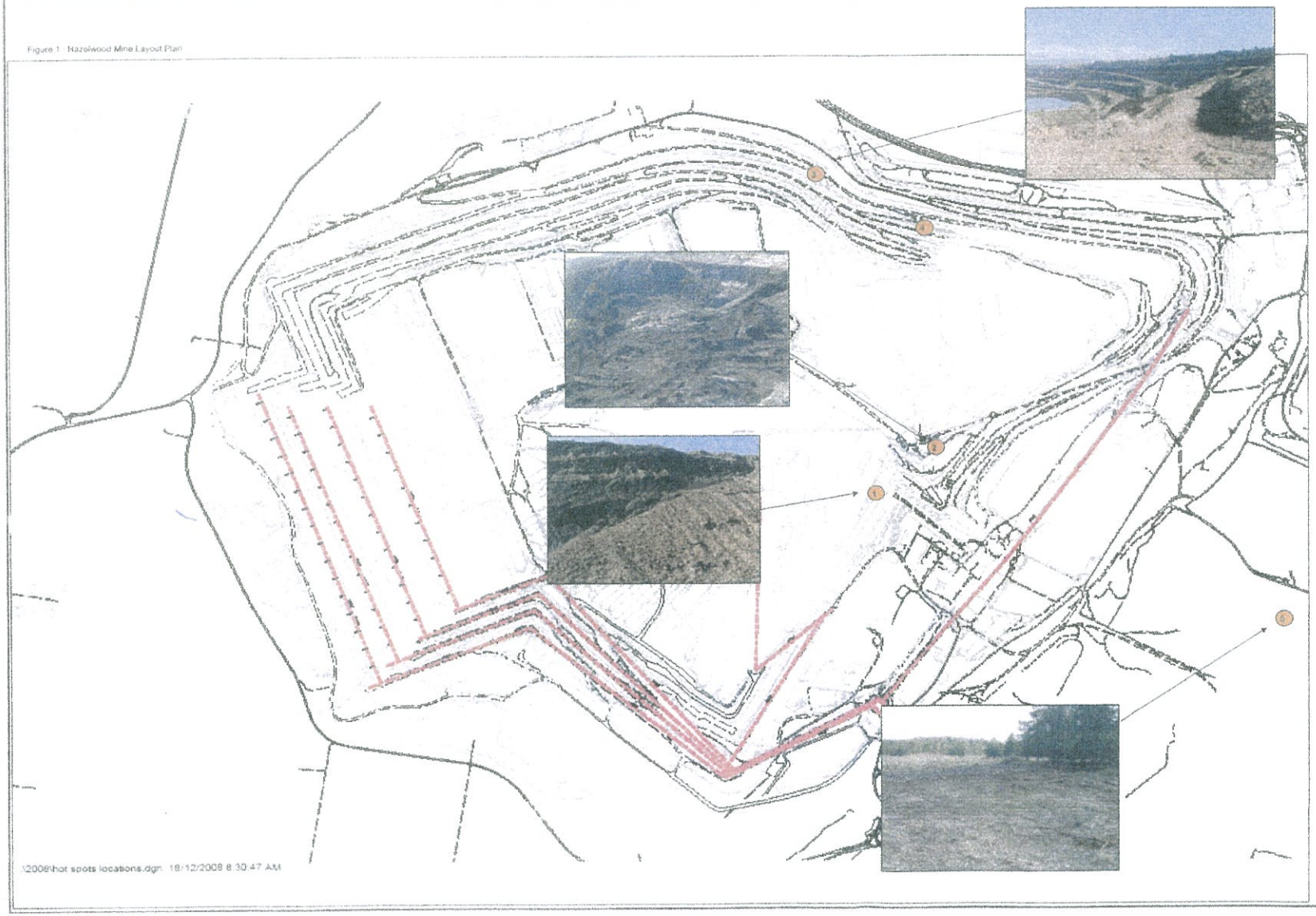


Monthly Hot Spot Inspection Report - June 2009

Mine Engineering
Ref: MF09-77/ MD09/1104
6th July 2009

Location		IDENTIFICATION OF PROBLEMS / PRESENT STATUS	REQUIRED ACTION / PURPOSE	ACTION REQUIRED By & PERSON RESPONSIBLE
Northern Batters 5 Level	1	No Hotspots noted - 3/6/09; 10/6/09; 17/6/09; 24/6/09	N/A	
SEF 1 Level	2	No Hotspots noted - 3/6/09; 10/6/09; 17/6/09; 24/6/09	N/A	
TP7 5 Level	3	No Hotspots noted - 3/6/09; 10/6/09; 17/6/09; 24/6/09	N/A	
5 Level Northern Batters near HARE	4	No Hotspots noted - 3/6/09; 10/6/09; 17/6/09; 24/6/09	N/A	
Eastern OB Dump	5	No Hotspots noted - 10/6/09; 24/6/09	N/A	

Figure 1 : Hazelwood Mine Layout Plan



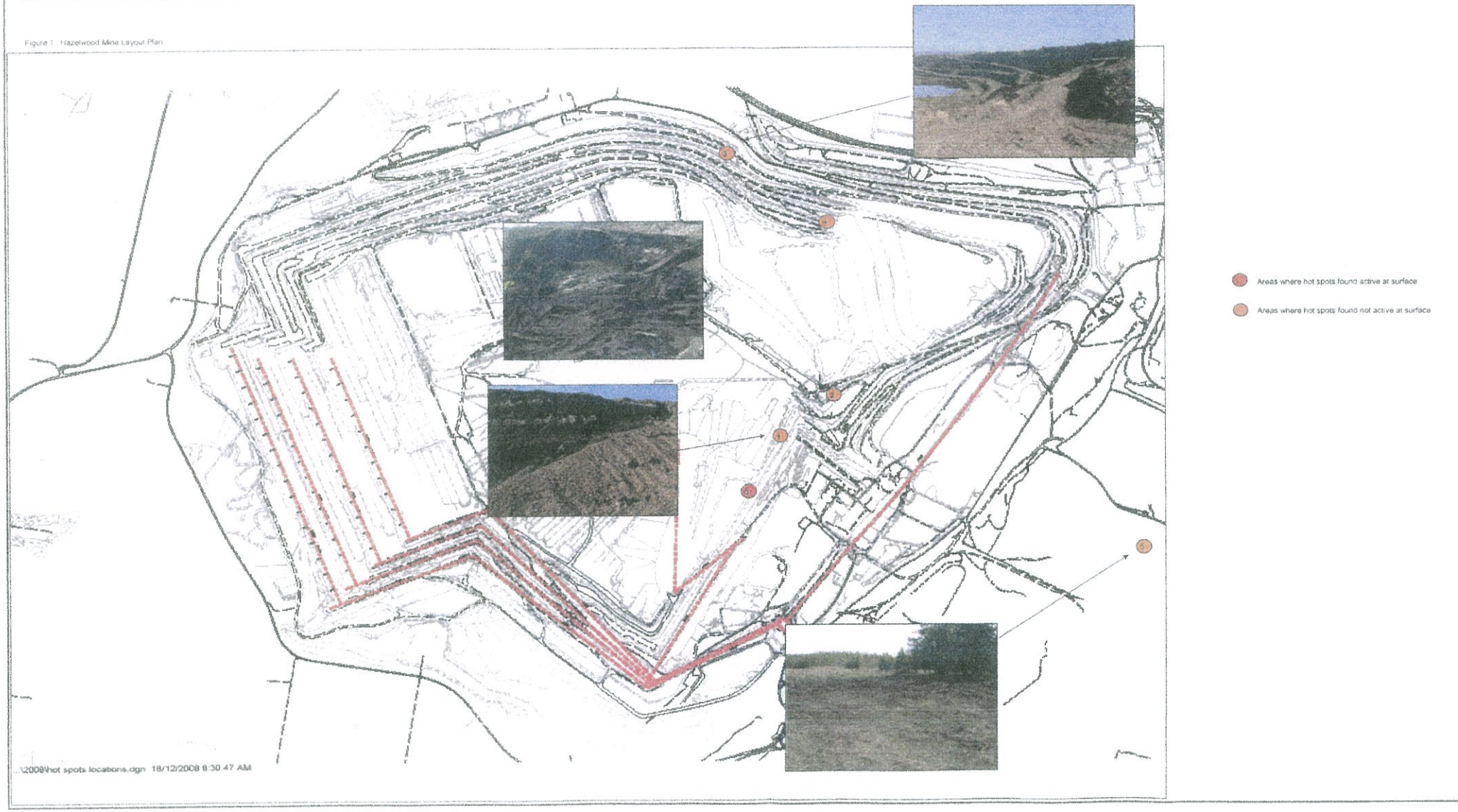
Mine Engineering
Ref: MF09-77/ MD10/1193
2nd August 2010

Hot Spot Inspection Report - July 2009

Distribution: Director Mining, Mine Fire/Water Coordinator, Alex Chisholm

Location		IDENTIFICATION OF PROBLEMS / PRESENT STATUS	REQUIRED ACTION / PURPOSE	ACTION REQUIRED By & PERSON RESPONSIBLE
Northern Batters 5 Level	1	No Hotspots noted - Inspected weekly thoughout June and July	N/A	
SEF 1 Level	2	No Hotspots noted - Inspected weekly thoughout June and July	N/A	
TP7 5 Level	3	No Hotspots noted - Inspected weekly thoughout June and July	N/A	
5 Level Northern Batters near HARE	4	No Hotspots noted - Inspected weekly thoughout June and July	N/A	
Eastern OB Dump	5	No Hotspots noted - Inspected weekly thoughout June and July	N/A	
SEF OB Dump	6	New Hot spot noticed on 23/7/10	Continue monitoring for further flare ups as part of inspections	AC

Figure 1: Hazelwood Mine Layout Plan



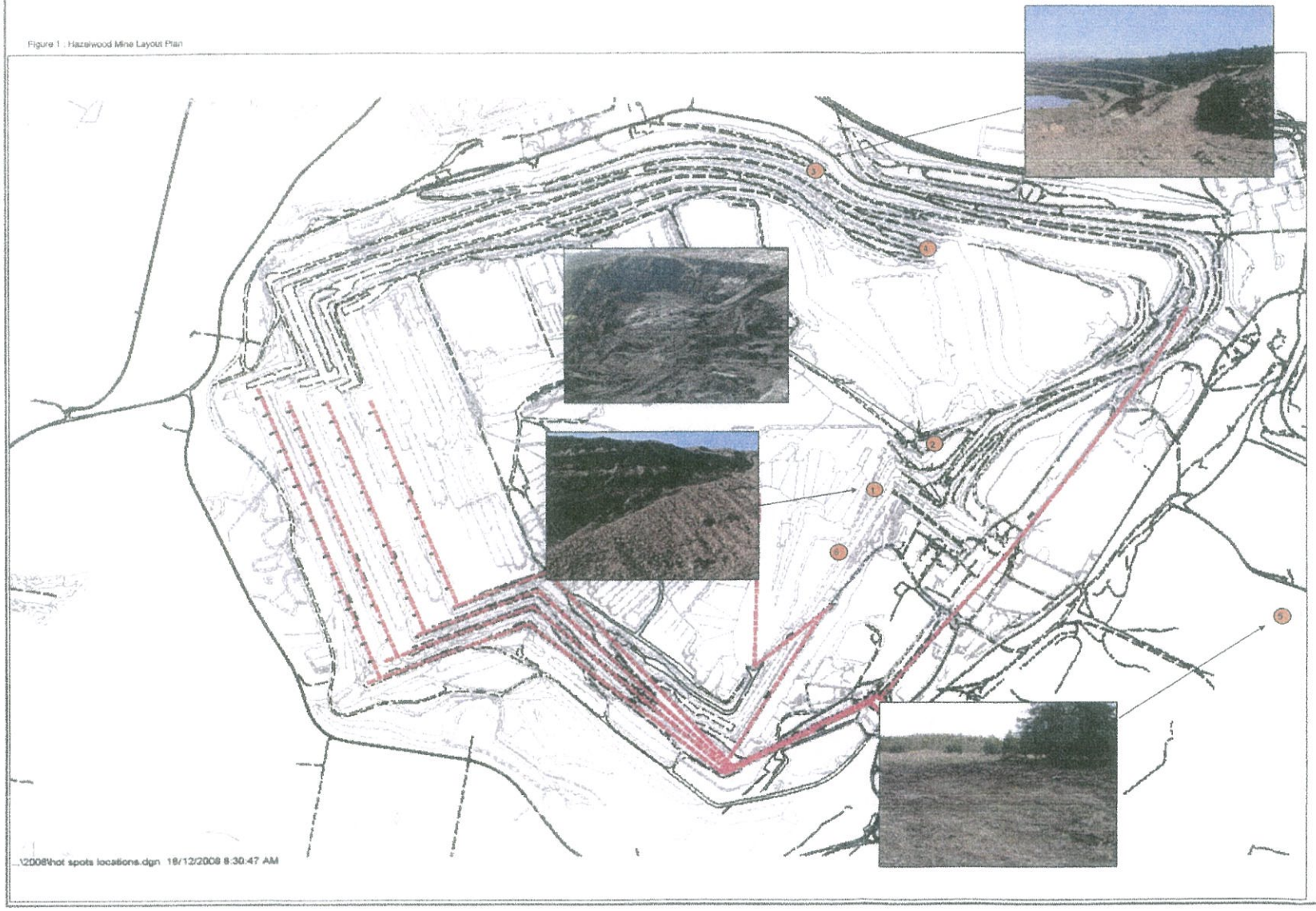
Hot Spot Inspection Report - September 2009

Distribution: Director Mining, Mine Fire/Water Coordinator; Alex Chisholm

Mine Engineering
Ref: MF09-77/, MD10/1614
20/10/2010

Location		IDENTIFICATION OF PROBLEMS / PRESENT STATUS	REQUIRED ACTION / PURPOSE	ACTION REQUIRED By & PERSON RESPONSIBLE
Northern Batters 5 Level	1	No Hotspots noted - Inspected weekly thoughout August and September	N/A	
SEF 1 Level	2	No Hotspots noted - Inspected weekly thoughout August and September	N/A	
TP7 5 Level	3	No Hotspots noted - Inspected weekly thoughout August and September	N/A	
5 Level Northern Batters near HARE	4	No Hotspots noted - Inspected weekly thoughout August and September	N/A	
Eastern OB Dump	5	No Hotspots noted - Inspected weekly thoughout August and September	N/A	
SEF OB Dump	6	No Hotspots noted - Inspected weekly thoughout August and September	NA	

Figure 1 : Hazelwood Mine Layout Plan



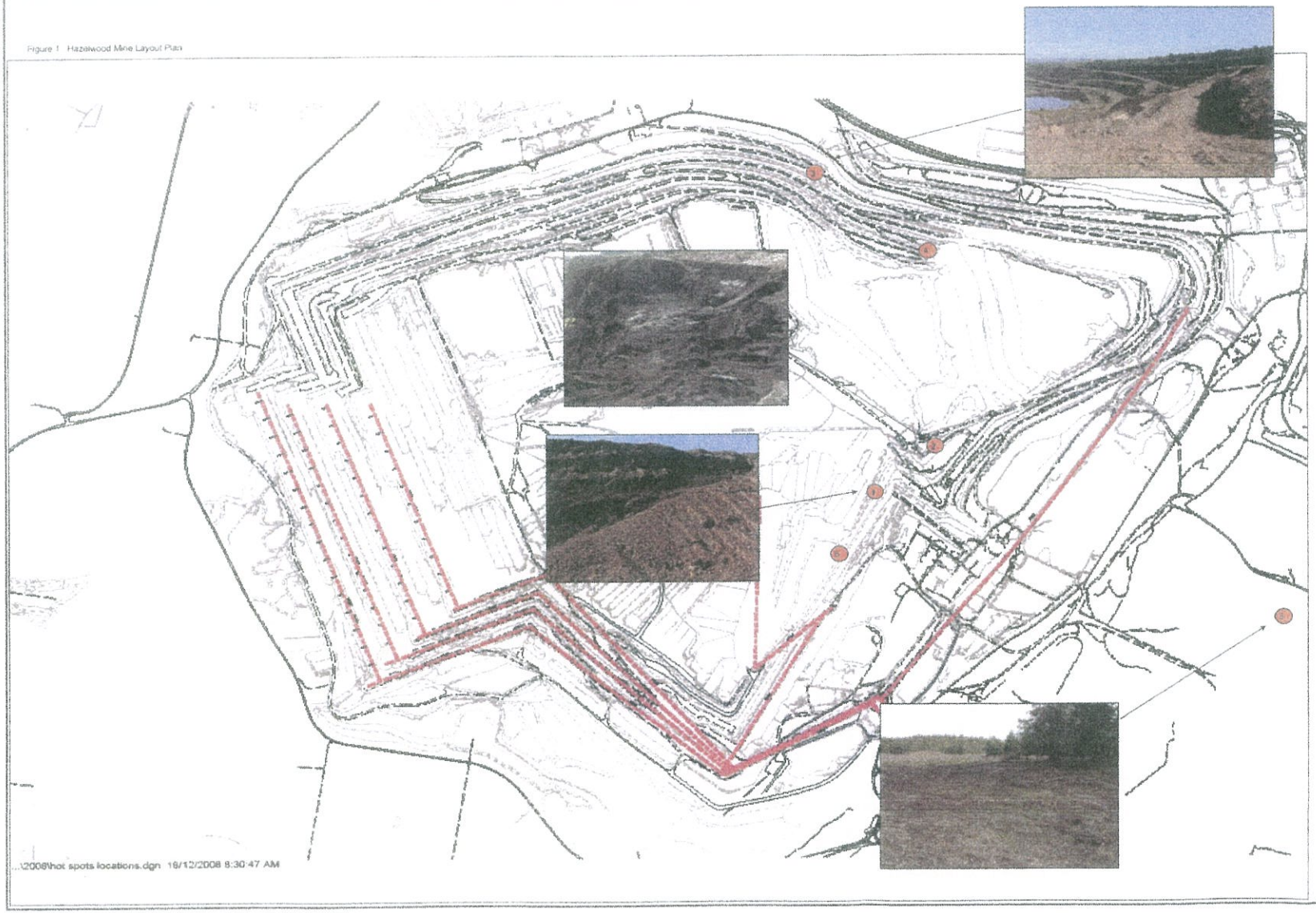
Hot Spot Inspection Report - November 2010

Distribution: Director Mining, Mine Operations Superintendant, Alex Chisholm

Mine Planning Dept
Ref: MP09-77/, MD10/1848
7/12/2010

Location		IDENTIFICATION OF PROBLEMS / PRESENT STATUS	REQUIRED ACTION / PURPOSE	ACTION REQUIRED By & PERSON RESPONSIBLE
Northern Batters 5 Level	1	No Hotspots noted - Inspected weekly thoughout October and November	N/A	
SEF 1 Level	2	No Hotspots noted - Inspected weekly thoughout October and November	N/A	
TP7 5 Level	3	No Hotspots noted - Inspected weekly thoughout October and November	N/A	
5 Level Northern Batters near HARE	4	No Hotspots noted - Inspected weekly thoughout October and November	N/A	
Eastern OB Dump	5	No Hotspots noted - Inspected weekly thoughout October and November	N/A	
SEF OB Dump	6	No Hotspots noted - Inspected weekly thoughout October and November	N/A	

Figure 1 Hazelwood Mine Layout Plan



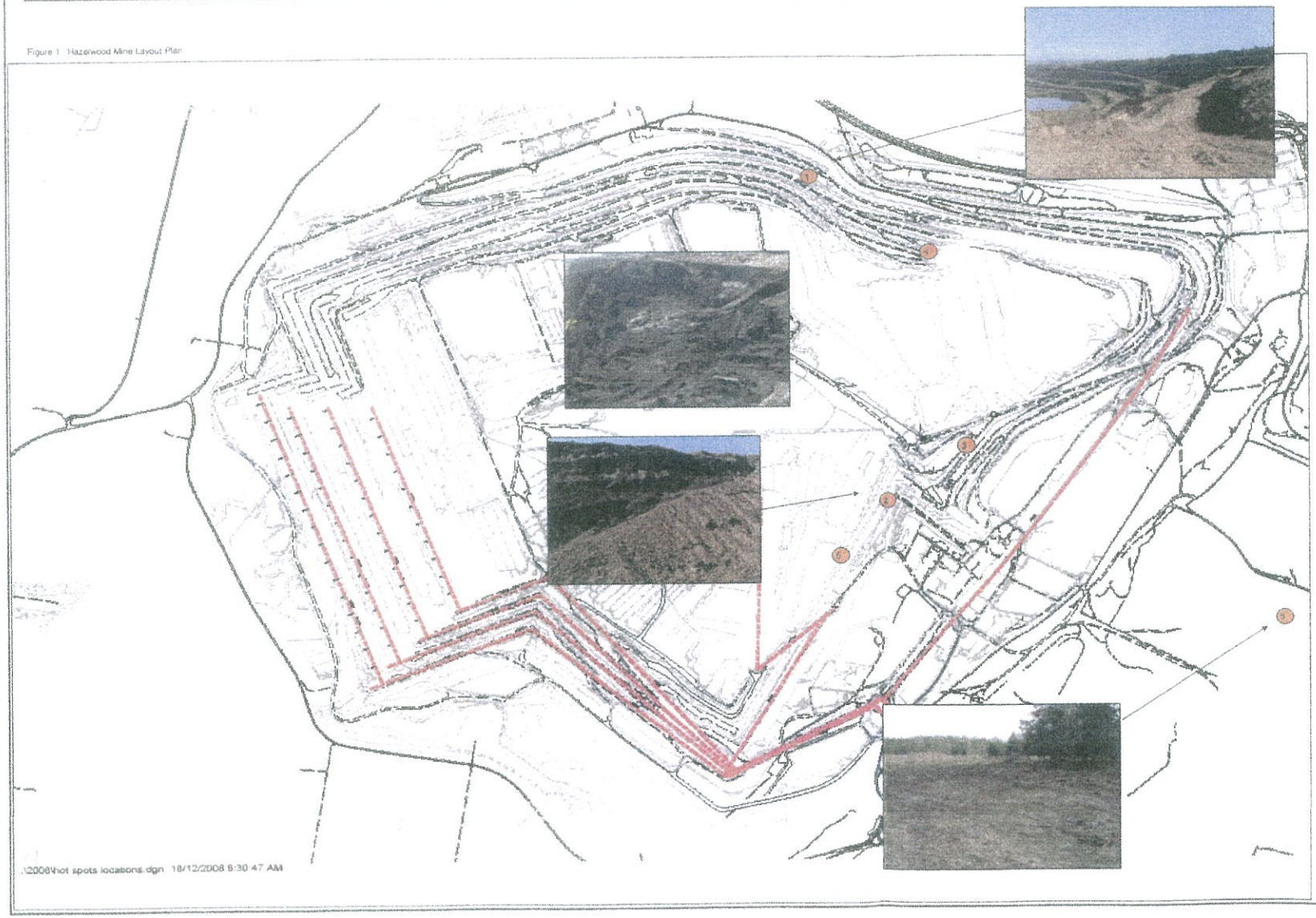
Mine Stability Dept.
Ref: MF09-77/, MD11/9
10/01/2011

Hot Spot Inspection Report - December 2010

Distribution: Director Mining; Mine Production Superintendant.

Location		IDENTIFICATION OF PROBLEMS / PRESENT STATUS	REQUIRED ACTION / PURPOSE	ACTION REQUIRED By & PERSON RESPONSIBLE
Northern Batters 5 Level	1	No Hotspots noted - Inspected weekly thoughout December	N/A	
SEF 1 Level	2	No Hotspots noted - Inspected weekly thoughout December	N/A	
TP7 5 Level	3	No Hotspots noted - Inspected weekly thoughout December	N/A	
5 Level Northern Batters near HARE	4	No Hotspots noted - Inspected weekly thoughout December	N/A	
Eastern OB Dump	5	No Hotspots noted - Inspected weekly thoughout December	N/A	
SEF OB Dump	6	No Hotspots noted - Inspected weekly thoughout December	N/A	

Figure 1 Hazelwood Mine Layout Plan



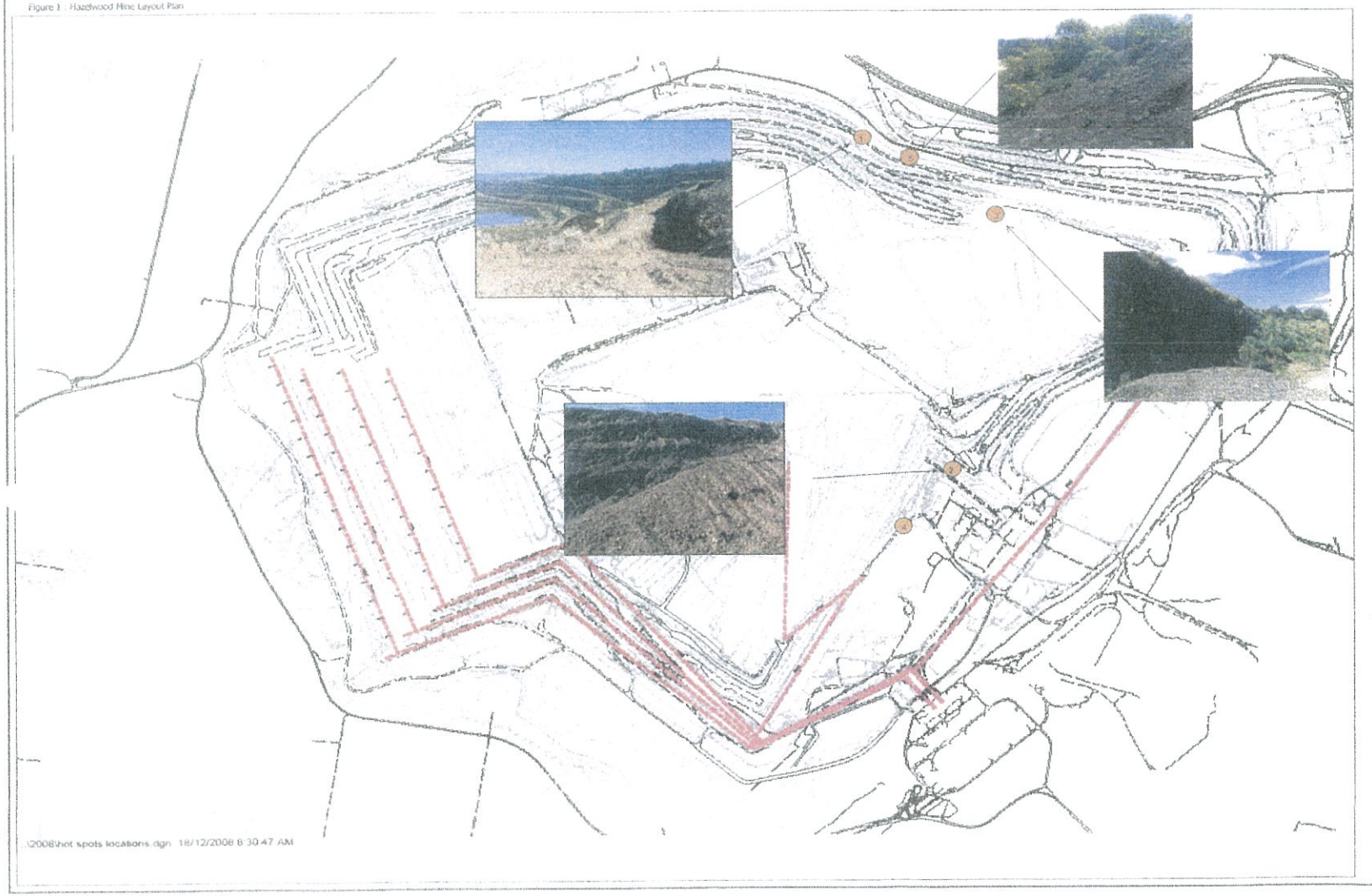
Hot Spot Inspection Report - SEPTEMBER 2012

Distribution: Director Mining

Mine Planning Dept.
Ref: MF09-77 MD12/369
3/09/2012

Location		IDENTIFICATION OF PROBLEMS / PRESENT STATUS	REQUIRED ACTION / PURPOSE (Other than weekly inpection)	ACTION REQUIRED By & PERSON RESPONSIBLE
Northern Batters 5 Level	1	Hotspot has become active throughout September, removed some coal then clay capping placed on area	Continue to monitor for further activity	A.C
SEF 1 Level	2	No Hotspots noted - Inspected weekly thoughout September	N/A	
5 Level Northern Batters near HART	3	No Hotspots noted - Inspected weekly thoughout September	N/A	
SEF OB Dump	4	No Hotspots noted - Inspected weekly thoughout September	N/A	
1 Level, near old DR 3 Ramp	5	No Hotspots noted - Inspected weekly thoughout September	N/A	

Figure 1 : Hazelwood Mine Layout Plan



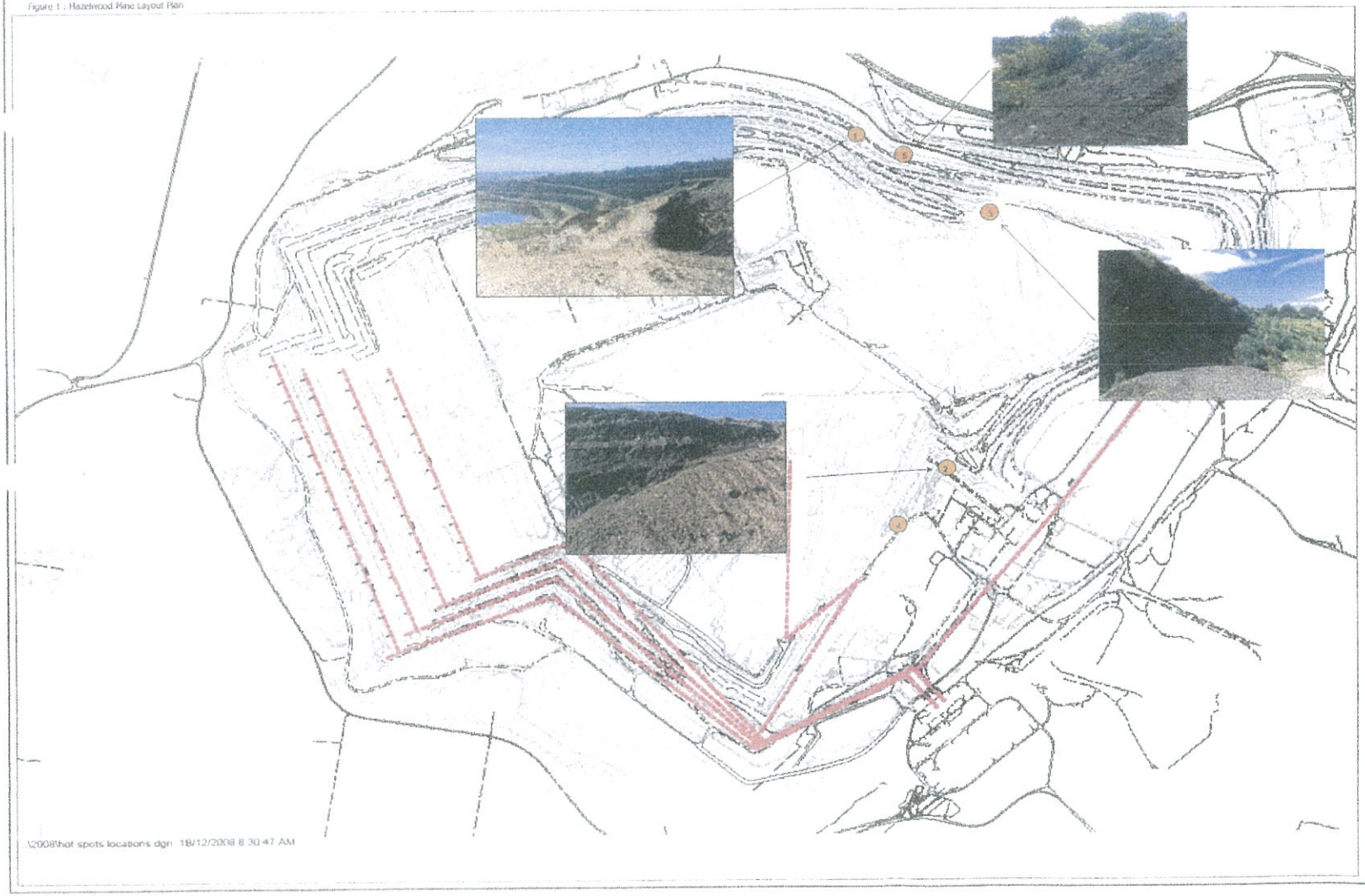
Mine Planning Dept.
ref: MP09-77 MD12/392
16/09/2012

Hot Spot Inspection Report - October 2012

Distribution: Director Mining

Location		IDENTIFICATION OF PROBLEMS / PRESENT STATUS	REQUIRED ACTION / PURPOSE (Other than weekly inpection)	ACTION REQUIRED By & PERSON RESPONSIBLE
Northern Batters 5 Level	1	Hotspot has become active throughout September, no further activity in October. **Access Condition:** Good	Continue to monitor for further activity	A.C.
SEF 1 Level	2	No Hotspots noted - Inspected weekly thoughout October. **Access Condition:** Good	N/A	
5 Level Northern Batters near HARE	3	No Hotspots noted - Inspected weekly thoughout October. **Access Condition:** Good	N/A	
SEF OB Dump	4	No Hotspots noted - Inspected weekly thoughout October. **Access Condition:** Good	N/A	
1 Level, near old DR 3 Ramp	5	No Hotspots noted - Inspected weekly thoughout October. **Access Condition:** Good	N/A	

Figure 1 : Hazelwood Mine Layout Plan

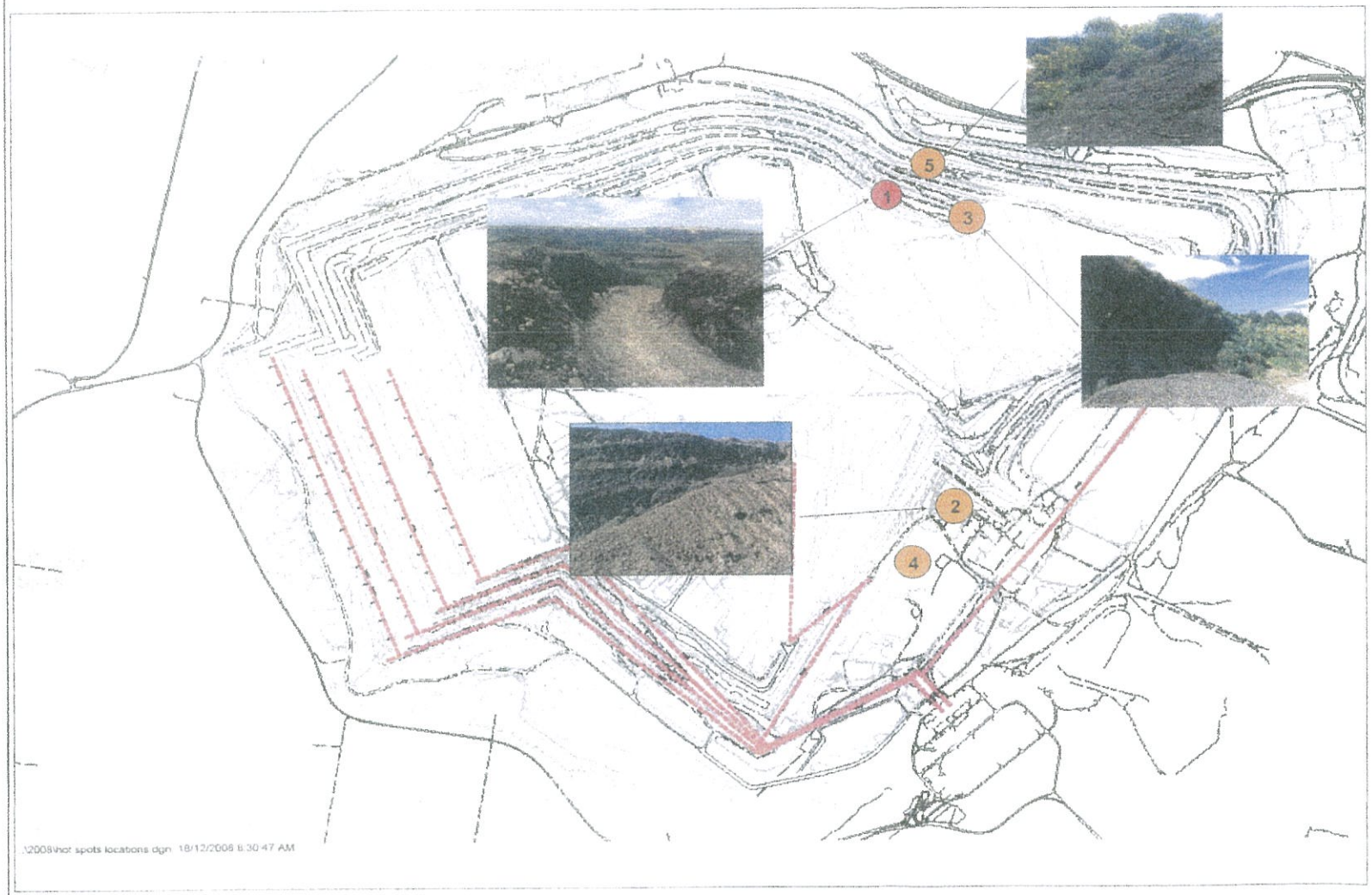


Mine Planning Dept
Ref: MP09-77 MD12/401
7/12/2012

Hot Spot Inspection Report - November 2012

Distribution: Director Mining

Location	IDENTIFICATION OF PROBLEMS / PRESENT STATUS	REQUIRED ACTION / PURPOSE (Other than weekly inpection)	ACTION REQUIRED By & PERSON RESPONSIBLE
Northern Batters 5 Level 1	Hotspot has become active throughout again throughout December. Smoking coal exposed on 7 Level Batter, now covered with clay. **Access Condition:** Good, although access to area east of F/H now cut off, accessible only via 2 rutted tracks	Continue to monitor for further activity	A.C
SEF 1 Level 2	No Hotspots noted - Inspected weekly throughout November. **Access Condition:** Good	N/A	
5 Level Northern Batters near HARE 3	No Hotspots noted - Inspected weekly throughout November. **Access Condition:** Good	N/A	
SEF OB Dump 4	No Hotspots noted - Inspected weekly throughout November. **Access Condition:** Good	N/A	
1 Level, near old DR 3 Ramp 5	No Hotspots noted - Inspected weekly throughout November. **Access Condition:** Good	N/A	

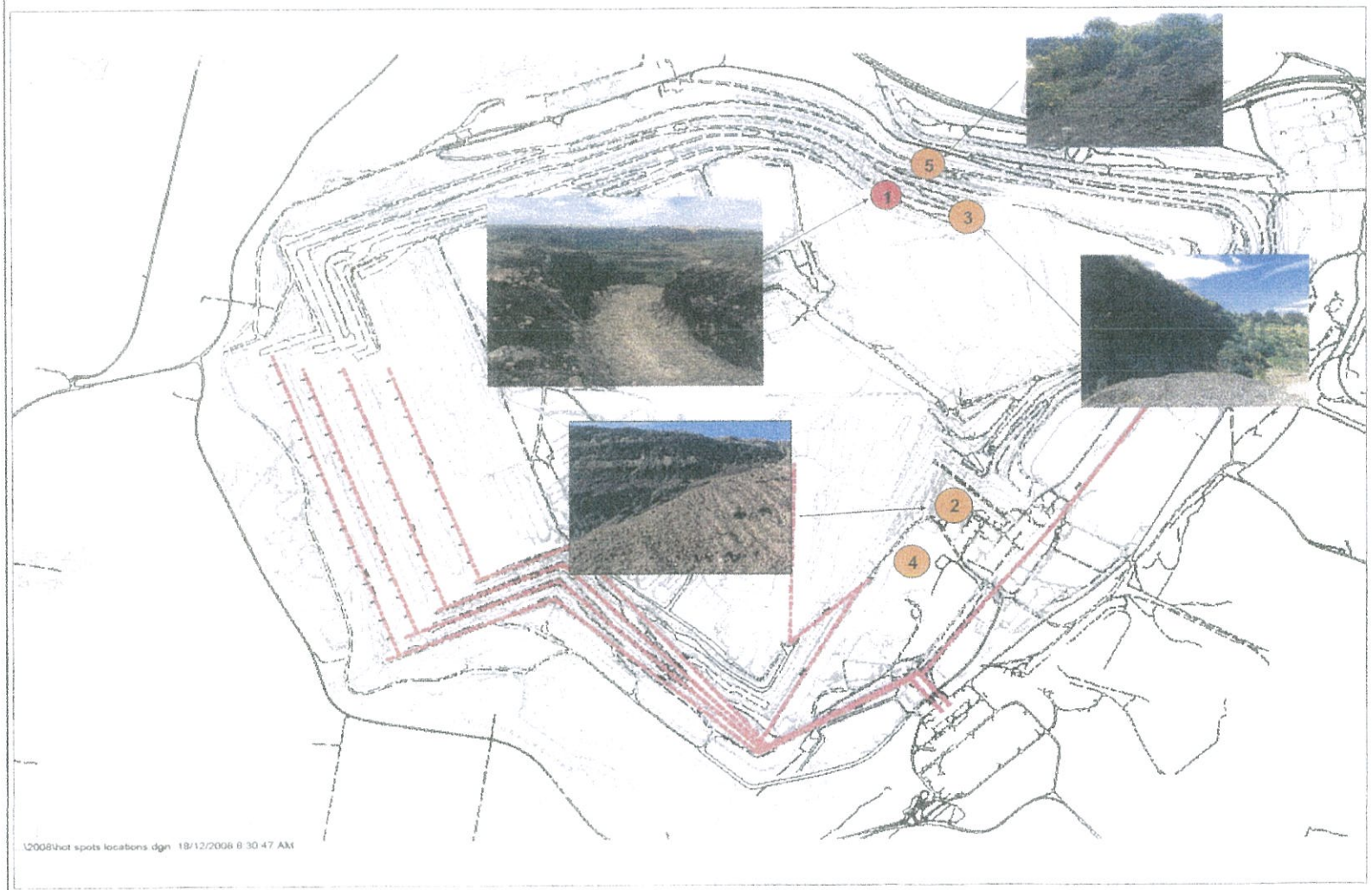


Mine Planning Dept.
Ref: MP09-77 MD13/92
7/01/2013

Hot Spot Inspection Report - December 2012

Distribution: Director Mining

Location	IDENTIFICATION OF PROBLEMS / PRESENT STATUS	REQUIRED ACTION / PURPOSE (Other than weekly inpection)	ACTION REQUIRED By & PERSON RESPONSIBLE
Northern Batters 5 Level 1	Hotspot has become active throughout again throughout December. Smoking coal exposed on 7 Level Batter in late December, now covered with clay. **Access Condition:** Good, although access to area east of F/H now cut off, accessible only via 2 rutted tracks	Continue to monitor for further activity	A,C
SEF 1 Level 2	No Hotspots noted - Inspected weekly thoughout December. **Access Condition:** Good	N/A	
5 Level Northern Batters near HARE 3	No Hotspots noted - Inspected weekly thoughout December. **Access Condition:** Good	N/A	
SEF OB Dump 4	No Hotspots noted - Inspected weekly thoughout December. **Access Condition:** Good	N/A	
1 Level, near old DR 3 Ramp 5	No Hotspots noted - Inspected weekly thoughout December. **Access Condition:** Good	N/A	



Areas where hot spots found active at surface

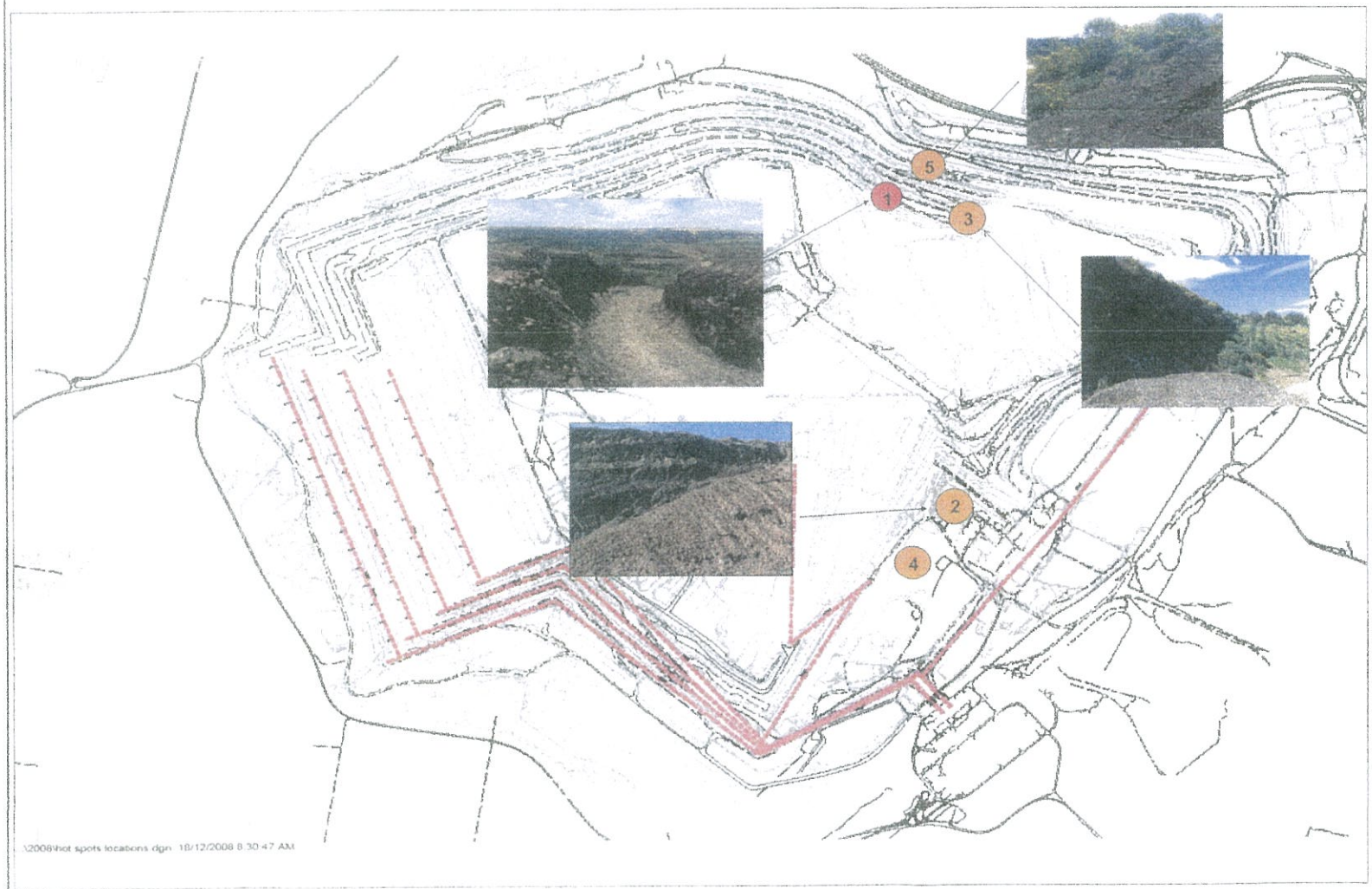
Areas where hot spots found not active at surface

Mine Planning Dept
Ref: MF09-77 MD13/250
5/02/2013

Hot Spot Inspection Report - January 2013

Distribution: Director Mining

Location	IDENTIFICATION OF PROBLEMS / PRESENT STATUS	REQUIRED ACTION / PURPOSE (Other than weekly inpection)	ACTION REQUIRED By & PERSON RESPONSIBLE
1 Northern Batters 5 Level	Hotspot active in December, no further activity during January. **Access Condition:** Good, although access to area east of fire hole now cut off, accessible only via 2 rutted tracks	Continue to monitor for further activity	A,C
2 SEF 1 Level	No Hotspots noted - Inspected weekly thoughout January. **Access Condition:** Good	N/A	
3 5 Level Northern Batters near HARE	No Hotspots noted - Inspected weekly thoughout January. **Access Condition:** Good	N/A	
4 SEF OB Dump	No Hotspots noted - Inspected weekly thoughout January. **Access Condition:** Good	N/A	
5 1 Level, near old DR 3 Ramp	No Hotspots noted - Inspected weekly thoughout January. **Access Condition:** Good	N/A	

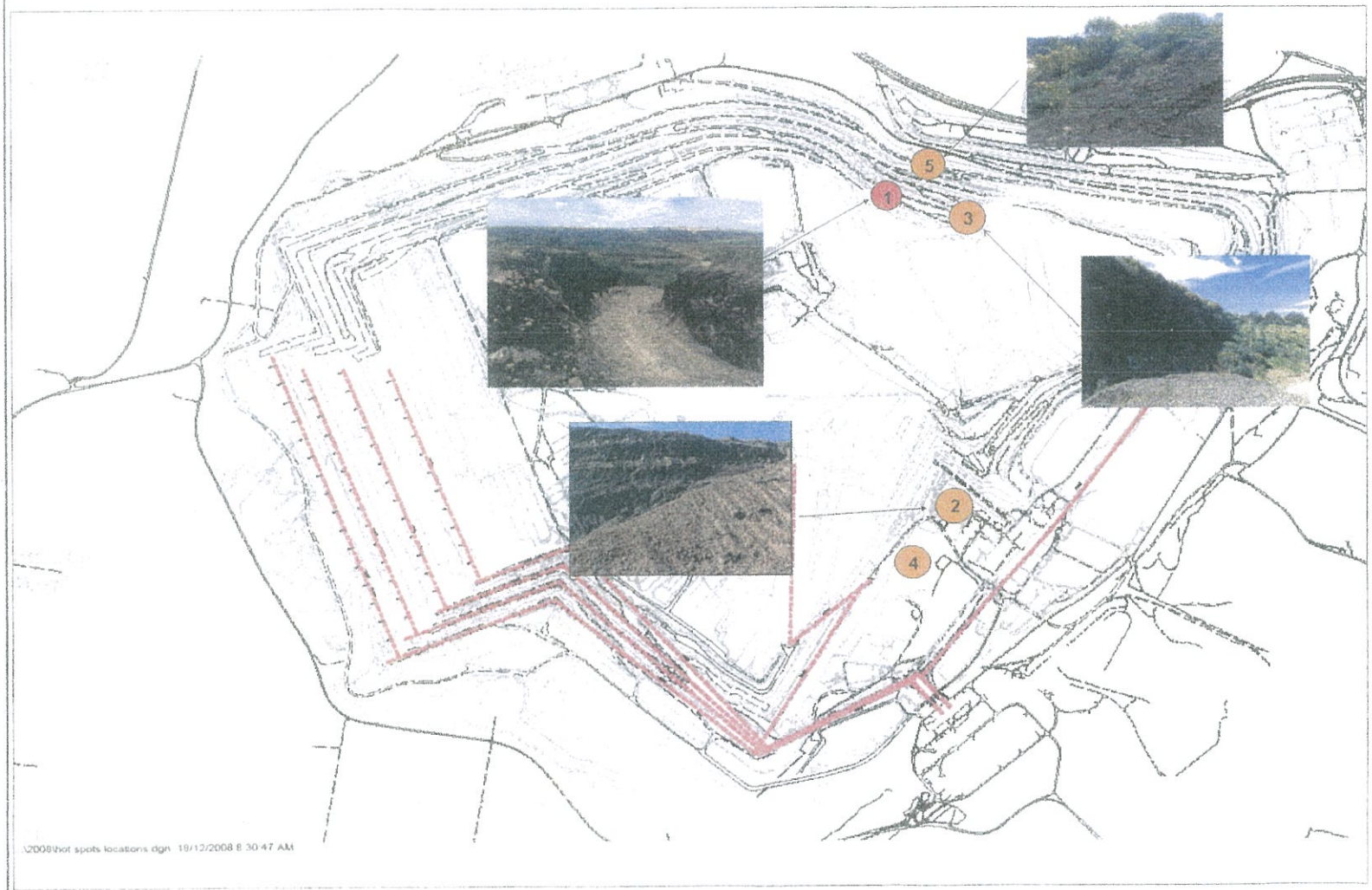


Mine Planning Dept
Ref: MP09-77 M013/294
1/03/2013

Hot Spot Inspection Report - February 2013

Distribution: Director Mining

Location	IDENTIFICATION OF PROBLEMS / PRESENT STATUS	REQUIRED ACTION / PURPOSE (Other than weekly inpection)	ACTION REQUIRED By & PERSON RESPONSIBLE
Northern Batters 5 Level 1	Hotspot active in February. Small amount of clay placed on active area. Work scheduled to further cover H/S in March. **Access Condition:** Good, although access to area east of fire hole now cut off, accessible only via 2 rutted tracks	Continue to monitor for further activity. Further cover H/S with O.B material	A.C
SEF 1 Level 2	No Hotspots noted - Inspected weekly thoughout February. **Access Condition:** Good	N/A	
5 Level Northern Batters near HARE 3	No Hotspots noted - Inspected weekly thoughout February. **Access Condition**: Good	N/A	
SEF OB Dump 4	No Hotspots noted - Inspected weekly thoughout February Report of the smell of smoke coming from area of F/H. **Access Condition**: Good	N/A	
1 Level, near old DR 3 Ramp 5	No Hotspots noted - Inspected weekly thoughout February. **Access Condition**: Good	N/A	

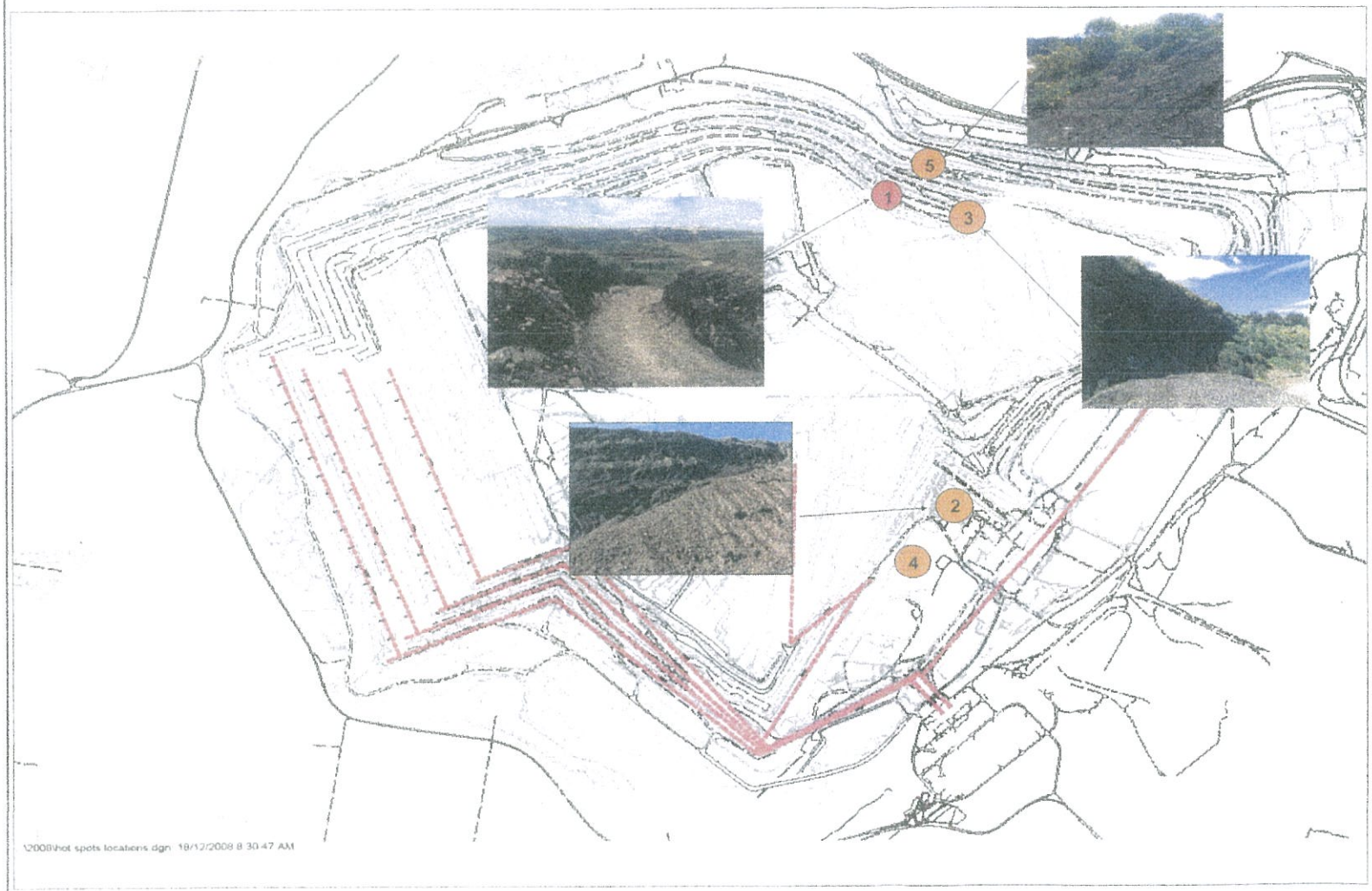


Hot Spot Inspection Report - March 2013

Distribution: Director Mining

Mine Planning Dept.
Ref: MP09-77 MD13/324
9/04/2013

Location	IDENTIFICATION OF PROBLEMS / PRESENT STATUS	REQUIRED ACTION / PURPOSE (Other than weekly inpection)	ACTION REQUIRED By & PERSON RESPONSTBLE
Northern Batters 5 Level 1	Hotspot active in March. **Access Condition:** Good, although access to area east of fire hole now cut off, accessible only via 2 rutted tracks	Continue to monitor for further activity. Continue to cover H/S with O.B material	A.C
SEF 1 Level 2	No Hotspots noted - Inspected weekly thoughout March. **Access Condition:** Good	N/A	
5 Level Northern Batters near HARE 3	No Hotspots noted - Inspected weekly thoughout March. **Access Condition:** Good	N/A	
SEF OB Dump 4	No Hotspots noted - Inspected weekly thoughout March. **Access Condition:** Good	N/A	
1 Level, near old DR 3 Ramp 5	No Hotspots noted - Inspected weekly thoughout March. **Access Condition:** Good	N/A	

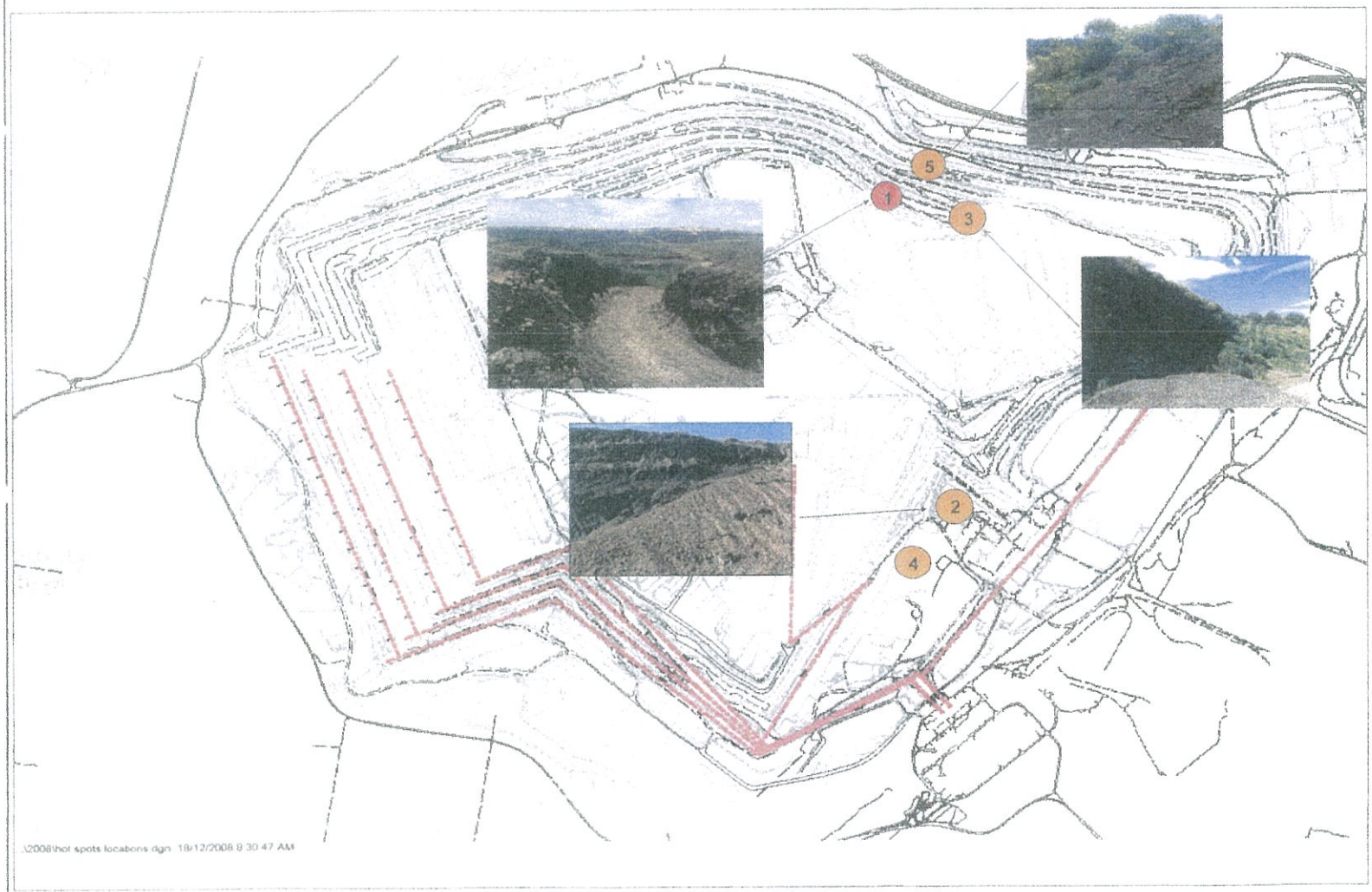


Mine Technical Services
Ref: MF09-77 MD13/426
23/05/2013

Hot Spot Inspection Report - April 2013

Distribution: Director Mining

Location	IDENTIFICATION OF PROBLEMS / PRESENT STATUS	REQUIRED ACTION / PURPOSE (Other than weekly inpection)	ACTION REQUIRED By & PERSON RESPONSIBLE
Northern Batters 5 Level 1	Hotspot active in April. **Access Condition:** Good, although access to area east of fire hole now cut off, accessible only via 2 rutted tracks	Continue to monitor for further activity. Continue to cover H/S with O.B material	A.C / S.C
SEF 1 Level 2	No Hotspots noted - Inspected weekly thoughout April. **Access Condition:** Good	N/A	
5 Level Northern Batters near HARE 3	No Hotspots noted - Inspected weekly thoughout April. **Access Condition:** Good	N/A	
SEF OB Dump 4	No Hotspots noted - Inspected weekly thoughout April. **Access Condition:** Good	N/A	
1 Level, near old DR 3 Ramp 5	No Hotspots noted - Inspected weekly thoughout April. **Access Condition:** Good	N/A	



Fire & Flood Management Systems – Weekly Status

Prepared By: Rob Dugan

Week Commencing: Monday 9th December 2013

Acceptable
Item of Concern
High Risk

Flood Mitigation Systems

Description	Comments	Status
Weather Forecast for next 7 days in relation to flooding	Outlook for the week is showers earlier in the week but no significant rain falls expected.	
Capacity to store incoming water	Pond Levels are controlled with Dirty Water Pumps coping with any additional rain	

Fire Mitigation Systems

Description	Comments	Status
Firefighting systems used for redundancy	Four Systems available	
Grass fire fuel – grass slashing program	Slashing Contract commenced and 15% complete	
Fire Audit 2013	Audit 100% complete and actions items 80% complete. On track to finish actions Mid to late December	
CFA Training Exercise	First Exercise scheduled 11th December 2013.	
Mine Employee's Fire Training	100% completed	
Fire Fighting Vehicles – firefighting equipment/Booster pumps	Fire Trucks and Trailer Booster Pumps weekly check	
Fire Season Declared 18/11/13	Individual vehicle Audits of fire equipment to be carried out	
Mine Emergency Response Plan, Mine Fire Instructions & Mine Fire Policy – Current	Updates including title changes for individuals completed.	

Fire Response Systems

Description	Comments	Status
Fire Service Pipes – Maintenance or Isolated prior to relocation	All Face Conveyor Headers available for operation	
Conveyor Tail end and Head end feeds connected	All T/E & H/E feeds are in service except for M820 due to a Belt shift today	
Dirty Water Pump Station (Pumps dirty water to C&D tanks)	3 of 3 pumps available	
Clean Water Pump Station (Pumps to Pondage)	3 of 5 Pumps available, 1 Spare, 1 on maint.	
P/H 50 at Pondage (Main Firefighting capacity)	2 of 5 pumps available. Power supply is now capable of running more than 2 pumps at a time. Currently meeting availability requirements with the 2 pumps whilst the 3rd & 4th pump are being overhauled. Expected RTS 18/12/13 which will provide additional redundancy in the system	
P/H 53 at Pondage (Main Firefighting capacity)	5 of 6 Pumps available, 1 tagged out	
P/H 54 Grass level (Supplies RCB, TP5 & TP8)	2 of 3 Pumps available 3rd pump being overhauled RTS 3rd week in December.	
Idler backlog and replacement numbers	Outstanding Backlog. ? idlers as of 9th Dec	

Fire Related Issues to be managed in the next week

Description	Comments	Status
Weather Forecast – next seven days	Maximum 24 deg. highest Temp for week on Thursday winds up to 20 km/h tending easterly showers earlier in the week	
Maintenance activities that may affect fire systems or response	No major activities to affect fire systems.	
Fire Hot Spots status throughout the Mine.	Nth Batter Hotspot remains plugged and does not	

	appear to be an issue at this point in time	

Fire Management Systems – Weekly Status

Prepared By: Rob Dugan

Week Commencing: Monday, 21st January 2013

Acceptable
Item of Concern
High Risk

Fire Mitigation Systems		
Description	**Comments**	**Status**
Firefighting systems used for redundancy	Four Systems available.	
Grass fire fuel – grass slashing program	100% complete with modified 2nd slashing along major road ways	
Fire Audit 2012	Internal, 100% Complete.	
CFA Training Exercise	Training for the CFA within the Mine scheduled in February 2013.	
Mine Employee's Fire Training	Estimated 80% completed training remainder to be completed mid-January	
Fire Emergency Response Exercise	2 x Exercises completed for 2012. 4 x Exercises programmed for 2013	
Fire Fighting Vehicles – firefighting equipment/Booster pumps	Fire Trucks and Trailer Booster Pumps weekly check Mine & P/Stn Fire Truck issues with ROPS cage	
Light Vehicles – Firefighting Pack Equipment	Is part of vehicle daily check to be audited monthly	
Communication Systems	Checking system to be developed	
Fire Response Systems		
Description	**Comments**	**Status**
Fire Service Pipes – Maintenance or Isolated prior to relocation	All Face Conveyor Headers available for operation	
Conveyor Tail end and Head end feeds connected	All T/E & H/E feeds are in service	
Dirty Water Pump Station (Pumps dirty water to C&D tanks)	3 of 3 pumps available	
Clean Water Pump Station (Pumps to Pondage)	3 of 5 Pumps available, 1 Spare, 1 on maint.	
P/H 50 at Pondage (Main Firefighting capacity)	3 of 5 pumps available, 2 on maint.	
P/H 53 at Pondage (Main Firefighting capacity)	4 of 6 Pumps available, 2 on Maint.	
P/H 54 Grass level (Supplies RCB, TP5 & TP8)	3 of 3 Pumps available	
CFA Relationship, Familiarisation	E.G other current fires locally, Developing better communication	
Mine Emergency Response Plan, Mine Fire Instructions & Mine Fire Policy – Current	Updates including title changes for individuals completed.	
Employee resource capacity in the event of fire	Employee resource expected to back to normal as holiday period finished	
Idler backlog and replacement numbers	Outstanding Backlog of 116 idlers out of approx. 22,000 idlers	
Fire Related Issues to be managed in the next week		
Description	**Comments**	**Status**
Weather Forecast – next seven days	Top Temp 36 for the week on Thursday with 30kph winds possible working restrictions in the mine.	
Maintenance activities that may affect fire systems or response	No major activities to affect fire systems	
Fire Hot Spots status throughout the Mine.	Nth Batter Hotspot has been capped again and is constantly monitored.	

Fire Management Systems – Weekly Status

Prepared By: Rob Dugan

Week Commencing: Monday, 7th January 2013

Acceptable
Item of Concern
High Risk

Fire Mitigation Systems		
Description	**Comments**	**Status**
Firefighting systems used for redundancy	Four Systems available.	
Grass fire fuel – grass slashing program	95% complete with additional slashing required on Strezlecki Hwy.	
Fire Audit 2012	Internal, 100% Complete.	
CFA Training Exercise	Training for the CFA within the Mine scheduled in February 2013.	
Mine Employee's Fire Training	Estimated 80% completed training remainder to be completed mid-January	
Fire Emergency Response Exercise	2 x Exercises completed for 2012. 4 x Exercises programmed for 2013	
Fire Fighting Vehicles – firefighting equipment/Booster pumps	Fire Trucks and Trailer Booster Pumps weekly check Mine & P/Stn Fire Truck issues with ROPS cage	
Light Vehicles – Firefighting Pack Equipment	Is part of vehicle daily check to be audited monthly	
Communication Systems	Checking system to be developed	
Fire Response Systems		
Description	**Comments**	**Status**
Fire Service Pipes – Maintenance or Isolated prior to relocation	All Face Conveyor Headers available for operation	
Conveyor Tail end and Head end feeds connected	All T/E & H/E feeds are in service	
Dirty Water Pump Station (Pumps dirty water to C&D tanks)	3 of 3 pumps available	
Clean Water Pump Station (Pumps to Pondage)	3 of 5 Pumps available, 1 Spare, 1 on maint.	
P/H 50 at Pondage (Main Firefighting capacity)	4 of 5 pumps available, 1 on maint.	
P/H 53 at Pondage (Main Firefighting capacity)	4 of 6 Pumps available, 2 on Maint.	
P/H 46 Grass level (Supplies RCB, TP5 & TP8)	3 of 3 Pumps available	
CFA Relationship, Familiarisation	E.G other current fires locally, Developing better communication	
Mine Emergency Response Plan, Mine Fire Instructions & Mine Fire Policy – Current	Updates including title changes for individuals completed.	
Employee resource capacity in the event of fire	Employee resource expected to back to normal as holiday period finished	
Idler backlog and replacement numbers	Outstanding Backlog of 177 idlers out of approx. 22,000 idlers	
Fire Related Issues to be managed in the next week		
Description	**Comments**	**Status**
Weather Forecast – next seven days	Top Temp 34 for the week on Monday, no significant winds with some rain during the week.	
Maintenance activities that may affect fire systems or response	No major activities to affect fire systems	
Fire Hot Spots status throughout the Mine.	Nth Batter Hotspot has been capped and is posing no threat at this stage.	

International Power
GDF SUEZ

Fire Management Systems – Weekly Status

Prepared By: Rob Dugan

Week Commencing: Monday, 31st December 2012

Acceptable
Item of Concern
High Risk

Fire Mitigation Systems

Description	Comments	Status
Firefighting systems used for redundancy	Four Systems available.	
Grass fire fuel – grass slashing program	90% complete with 3 Slashers Operating.	
Fire Audit	Internal, 100% Complete.	
CFA Training Exercise	Training for the CFA within the Mine scheduled in February 2013.	
Mine Employee's Fire Training	Estimated 80% completed training remainder to be completed mid-January	
Fire Emergency Response Exercise	2 x Exercises completed for 2012. 4 x Exercises programmed for 2013	
Fire Fighting Vehicles – firefighting equipment/Booster pumps	Fire Trucks and Trailer Booster Pumps weekly check Mine & P/Stn Fire Truck issues with ROPS cage	
Light Vehicles – Firefighting Pack Equipment	Is part of vehicle daily check to be audited monthly	
Communication Systems	Checking system to be developed	

Fire Response Systems

Description	Comments	Status
Fire Service Pipes – Maintenance or Isolated prior to relocation	All Face Conveyor Headers available for operation	
Conveyor Tail end and Head end feeds connected	All T/E & H/E feeds are in service	
Dirty Water Pump Station (Pumps dirty water to C&D tanks)	3 of 3 pumps available	
Clean Water Pump Station (Pumps to Pondage)	3 of 5 Pumps available, 1 Spare, 1 on maint.	
P/H 50 at Pondage (Main Firefighting capacity)	4 of 5 pumps available, 1 on maint.	
P/H 53 at Pondage (Main Firefighting capacity)	4 of 6 Pumps available, 2 on Maint.	
P/H 46 Grass level (Supplies RCB, TP5 & TP8)	3 of 3 Pumps available	
CFA Relationship, Familiarisation	E.G other current fires locally, Developing better communication	
Mine Emergency Response Plan, Mine Fire Instructions & Mine Fire Policy – Current	Updates including title changes for individuals completed.	
Employee resource capacity in the event of fire	New Year holidays this period , 1x7 & 2x12 rostered on but minimum maintenance & Office personnel	
Idler backlog and replacement numbers	Outstanding Backlog of 177 idlers out of approx. 22,000 idlers	

Fire Related Issues to be managed in the next week

Description	Comments	Status
Weather Forecast – next seven days	Top Temp 38 Friday but no winds / Max. winds during week expected 35kmh on Tuesday	
Maintenance activities that may affect fire systems or response	No major activities to affect fire systems	
Fire Hot Spots status throughout the Mine.	Nth Batter Hotspot has opened up requiring clay to be trucked in to smother it. Estimated to be complete by end of Monday 31st Dec.	


International Power
GDF SUEZ

Fire Management Systems – Weekly Status

Prepared By: Rob Dugan

Week Commencing: Monday, 17th December 2012

Acceptable
Item of Concern
High Risk

Fire Mitigation Systems		
Description	**Comments**	**Status**
Firefighting systems used for redundancy	Four Systems available.	
Grass fire fuel – grass slashing program	90% complete with 3 Slashers Operating.	
Fire Audit	Internal, 100% Complete.	
CFA Training Exercise	Training for the CFA within the Mine scheduled in February 2013.	
Mine Employee's Fire Training	Estimated 80% completed training remainder to be completed mid-December	
Fire Emergency Response Exercise	One completed in August, second exercise completed December 2012	
Fire Fighting Vehicles – firefighting equipment/Booster pumps	Fire Trucks and Trailer Booster Pumps weekly check	
Light Vehicles – Firefighting Pack Equipment	Is part of vehicle daily check to be audited monthly	
Communication Systems	Checking system to be developed	

Fire Response Systems		
Description	**Comments**	**Status**
Fire Service Pipes – Maintenance or Isolated prior to relocation	All Face Conveyor Headers available for operation	
Conveyor Tail end and Head end feeds connected	All T/E & H/E feeds are in service	
Dirty Water Pump Station (Pumps dirty water to C&D tanks)	3 of 3 pumps available	
Clean Water Pump Station (Pumps to Pondage)	3 of 3 Pumps available	
P/H 50 at Pondage (Main Firefighting capacity)	5 of 5 pumps available	
P/H 53 at Pondage (Main Firefighting capacity)	4 of 6 Pumps available	
P/H 46 Grass level (Supplies RCB, TP5 & TP8)	3 of 3 Pumps available	
CFA Relationship, Familiarisation	E.G other current fires locally, Developing better communication	
Mine Emergency Response Plan, Mine Fire Instructions & Mine Fire Policy – Current	Updates including title changes for individuals completed.	
Employee resource capacity in the event of fire	No major holiday period in the next week	
Idler backlog and replacement numbers	Outstanding Backlog of Idlers & completed No.'s to be documented next week	

Fire Related Issues to be managed in the next week		
Description	**Comments**	**Status**
Weather Forecast – next seven days	Top Temp 30 with rain at the same time / Max. winds during week expected 22kmh	
Maintenance activities that may affect fire systems or response	No major activities to affect fire systems	
Fire Hot Spots status throughout the Mine.	November Inspection completed all Okay	


International Power
GDF SUEZ

Fire Management Systems – Weekly Status

Prepared By: Rob Dugan

Week Commencing: Monday, 19th of November 2012

Acceptable
Item of Concern
High Risk

Fire Mitigation Systems		
Description	**Comments**	**Status**
Firefighting systems used for redundancy	Four Systems available.	
Grass fire fuel – grass slashing program	Has commenced 15% complete and is ramping up.	
Fire Audit	Internal, 90% Complete.	
CFA Training Exercise	Training for the CFA within the Mine scheduled in December 2012.	
Mine Employee's Fire Training	Estimated 90% completed training remainder to be completed mid-December	
Fire Emergency Response Exercise	One completed in August, second exercise due in December 2012	
Fire Fighting Vehicles – firefighting equipment/Booster pumps	Fire Trucks and Trailer Booster Pumps weekly check 2x Fire trucks Mechanical issues	
Light Vehicles – Firefighting Pack Equipment	Is part of vehicle daily check to be audited monthly	
Communication Systems	Checking system to be developed	

Fire Response Systems		
Description	**Comments**	**Status**
Fire Service Pipes – Maintenance or Isolated prior to relocation	All Face Conveyor Headers available for operation	
Conveyor Tail end and Head end feeds connected	All T/E & H/E feeds are in service	
Dirty Water Pump Station (Pumps dirty water to C&D tanks)	3 pumps available	
Clean Water Pump Station (Pumps to Pondage)	3 Pumps available	
P/H 50 at Pondage (Main Firefighting capacity)	5 pumps available	
P/H 53 at Pondage (Main Firefighting capacity)	4 pumps available out of 6 Pumps	
P/H 46 Grass level (Supplies RCB, TP5 & TP8)	3 Pumps available	
CFA Relationship, Familiarisation	E.G other current fires locally, Developing better communication	
Mine Emergency Response Plan – Current, Communicated and Adhered to	Any updates including title changes for individuals to be completed by end of November	
Employee resource capacity in the event of fire	No major holiday period in the next week	

Fire Related Issues to be managed in the next week		
Description	**Comments**	**Status**
Weather Forecast – next seven days	Top Temp 26 / winds up to 18kmh	
Maintenance activities that may affect fire systems or response	No major activities to affect fire systems	


International Power
GDF SUEZ

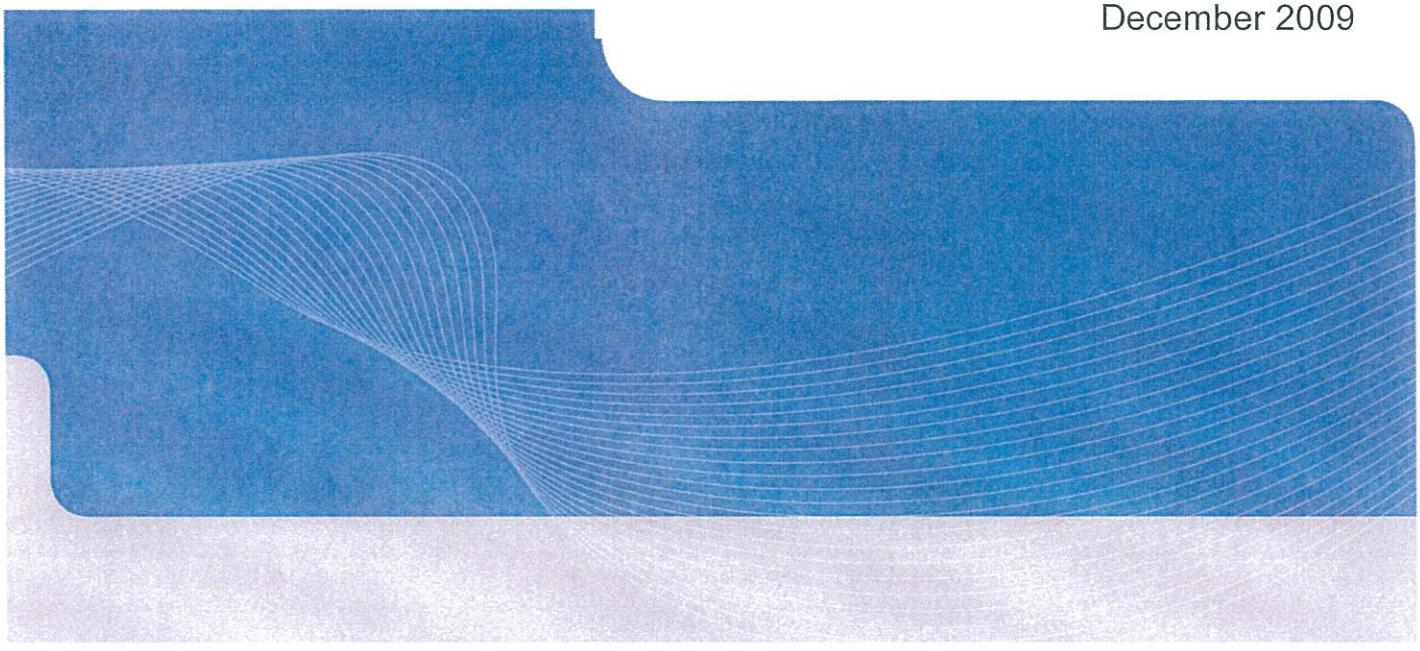
CLIENTS | PEOPLE PERFORMANCE

International Power Hazelwood

Report for Major Mining Hazards Assessment

Interim Submission

December 2009



Contents

Table Index

Figure Index

Appendices

Executive Summary

Hazelwood Mine (International Power) commissioned GHD to facilitate Safety Assessments on their Major Mining Hazards. The Victorian Occupational Health and Safety (OHS) Regulations 2007 define a Major Mining Hazard (MMH) as a mining hazard that has the potential to cause an incident that would cause, or pose a significant risk of causing, more than one death (Reg. 1.1.5).

This is an interim report covering the Safety Assessments conducted at Hazelwood using a team-based assessment approach over the course of four workshops in December 2009. The Safety Assessments identified risks associated with selected MMHs within and adjacent to Hazelwood's mining area. Bow-tie diagrmas were developed for each MMH group. Existing control measures including Critical System and Risk controls, and potential additional controls were identified.

In total 321 existing controls were listed. The workshop team raised 11 potential controls for possible future implementation. 22 Critical System controls and 33 Risk (engineering) controls were identified collectively for the MMHs at Hazelwood Mine.

Ongoing further works include risk assessments to be be carried out for each of the scenarios for the MMHs illustrating that risk has been reduced to as low as reasonably practicable. Additionally, the next phase of the safety assessment process requires the development of Performance Standards for all Critical System and Risk Controls.

1. Introduction

1.1 Overview

Hazelwood Mine (International Power) commissioned GHD to facilitate Safety Assessments on their Major Mining Hazards. The Victorian Occupational Health and Safety (OHS) Regulations 2007 define a Major Mining Hazard (MMH) as a mining hazard that has the potential to cause an incident that would cause, or pose a significant risk of causing, more than one death (Reg. 1.1.5).

This is an interim report covering the Safety Assessments conducted at Hazelwood using a team-based assessment approach over the course of four workshops in December 2009.

1.2 Scope of Work

The scope of work for the MMH Safety Assessments captured the following requirements.

- Review Hazelwood's Mining Hazards Register and assess currently recognised MMHs against the definition for MMHs in the Victorian OHS Regulations 2007 (regulation 1.1.5). On the basis of hazards that match the definition, select representative hazard groupings for Safety Assessment.
- For each MMH, conduct a team-based workshop exercise to identify representative, reasonable and thoroughly defined risk scenarios that have the potential to lead to a multiple fatality.
- For each risk scenario, identify current controls and select "Critical System' & 'Risk' controls.
- Develop performance standards for all identified 'Critical System' & 'Risk' Controls.

2. Assessment Methodology

2.1 Principles

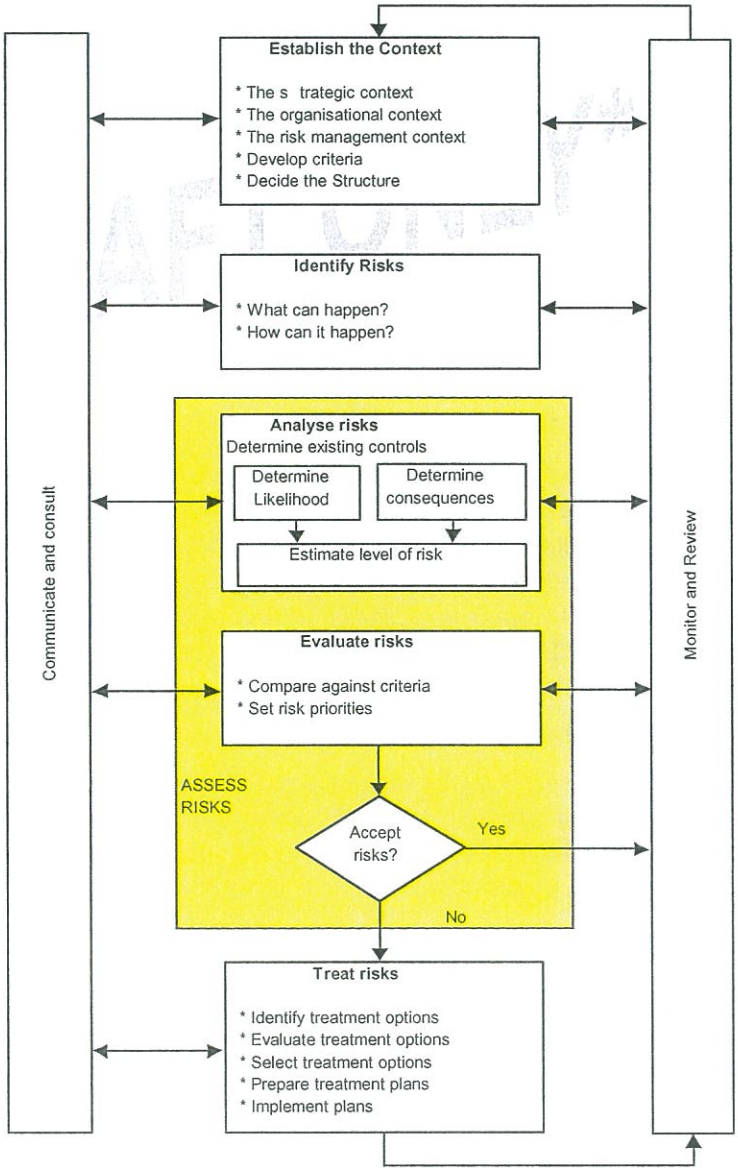
The methodology adopted contemporary principles for team-based risk assessments, including the method steps and ideals reflected by the following standards.

- AS/NZS ISO 31000:2009 (Risk Management) published by Standards Australia.
- MDG 1010 (Risk Management Handbook for The Mining Industry) published by NSW Department of Primary Industries.

Each of these standards provided guidelines for conducting the safety assessments.

A model process for a risk assessment is shown in the following diagrams, reflecting the AS/NZS ISO 31000 process steps.

Figure 1 - AS ISO 31000 Process diagram



This generic process diagram was used by the workshop team to develop a work-breakdown structure, which is shown overleaf. This work-breakdown structure was used to guide each MMH workshop and is shown in Table 1.

Table 1 **Work-breakdown structure**

Step	Work activity	See Section	See Appendix
1	Scope & objectives	1.1, 1.2, 3	
2	MMH Safety Assessment process	2	
3	Model scenario dynamics in a bow-tie diagram	2.3, 2.4, 2.5	A
4	Critical Control Selection	2.5	B
5	Performance Standard Development	4	C

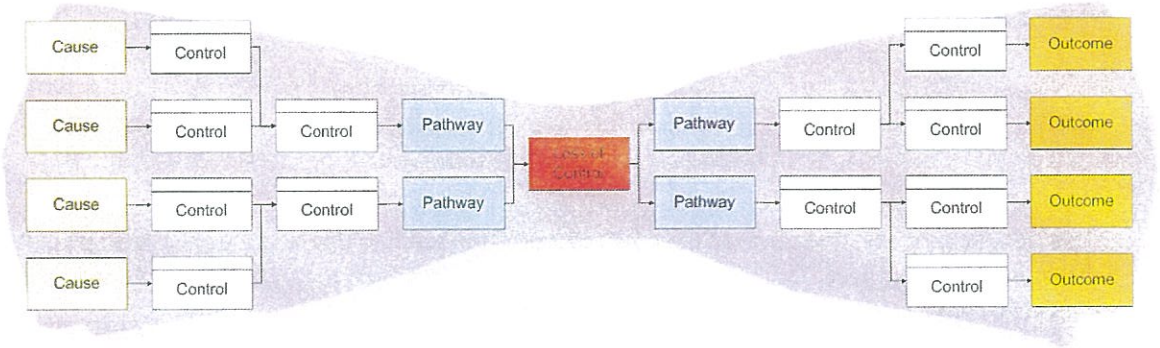
2.2 Review of 2004 Study & Selection of MMHs

Prior to the commencement of the structured workshop process a review of the 2004 Major Mining Hazard study was conducted. This was done to recognise hazards that are still applicable to Hazelwood Mine and identify any new MMHs that are now relevant to the operation. Thirteen potential MMHs were identified. This list was reduced to 10 with flooding, flammable gas release in workshop and Earthworks failure being the 3 MMHs not viewed as credible multiple fatality events relevant to Hazelwood mine. A more detailed description of the MMHs can be found in Section 3.

2.3 Bow-tie Diagrams

This 'bow-tie' diagram represents causes and outcomes associated with any failure type, and the current study developed a bow-tie diagram for each MMH group. The bow-tie format displays causes, loss of control events, consequences, and control types on one diagram to allow appreciation of the 'scenario dynamics' of a risk event, as shown in Figure 2.

Figure 2 - Bow-tie (scenario dynamics) format



2.3.1 Bow-tie Validation

Prior to the formal workshop process a validation and update of the 2004 bow-ties was conducted. This involved the preparation of bow-ties by a GHD consultant in a smaller workshop setting where a member of Mine Management, Mine Asset Manager and a Safety Representative were present. All known, reasonably foreseeable causes associated with each MMH group were itemised and listed for the team's reference. This was done in order to effectively 'gear' the team workshops to be held for each of the 10 MMHs.

2.4 Workshop Process

GHD facilitated 4 MMH workshops in December 2009. Schedules for the assessments are shown in Table 2. The objective of these workshops was to engage discussion amongst relevant personnel regarding each of the MMHs. This involved a further review and update of the bow-ties and determination of Critical System and Risk Controls (Section 2.5). Key features of the workshop process were :

- A comprehensive team of experienced participants was required. The team make-up and experience are listed in Table 3.
- Independent facilitation. A GHD facilitator led the team through a structured process.

In addition to a 'core group' that attended each of the MMH workshops appropriate MMH 'specialist groups' were assembled for workshop exercises relevant to their area of expertise. The basis for this decision was so that the relevant team members for that specific MMH group (and its associated work activities, equipment maintenance and management systems and control monitoring and inspection tasks) could be brought together. This provided access to recorded data, incidents, information and knowledge relating to the subject at hand. The team summarised all known information concerning each MMH group, past incidents and events, and known future plans and anticipated threats and vulnerabilities. These included summaries of the following issues.

- Lost-time injury events, reportables, accident reports and investigations.
- Regulator Safety Alerts and Notices relating to MMH issues.
- Planned changes to assets, layout, work design and workflow configuration.
- The MMH team members were taken through a MMH Safety Assessment training and awareness session prior to each workshop.
- WorkSafe personnel at times observed Hazelwood and GHD personnel, in order to provide differing perspectives and input into the process.

Table 2 Hazelwood MMH List

MMH group	Workshop date
1. Confined Spaces	2nd December, 2009

2. Mobile Plant Interactions	2nd December, 2009
3. Dredger / Stacker Collapse	3rd December, 2009
4. Jacking of Plant	8th December, 2009
5. Vehicle Interactions	3rd December, 2009
6. Exposure to HV Electricity	3rd December, 2009
7. Mine Fire	8th December, 2009
8. Batter Failure (Engulfment or fall from heights)	8th December, 2009
9. Falling Materials and Loads (Gravity)	9th December 2009
10. Structural Failure of Fixed Structures	9th December 2009

Table 3 Attendance List

Name	Position/Role	Department/ Company	Industry years	MMH Attended
Rob Kaiser	Maint/Engineering	IPRH	2.5	1,2,3,4,5,6,7,9
Peter Brimblecombe	Asset Manager,Maint	IPRH	30	1,2,3,4,5,6,7,8,9,10
Kevin Hayes	Inspector	Worksafe	20	1
Greg Sleziak	Inspector	Worksafe	15	1
Gaetano Giardina	HSR Operations	IPRH	20	1,3,4,5,6,7,9
Mark Callow	Maint HSR	IPRH	32	1,2,3,4,5,6,7,9
Stuart Reeves	Planning	Belle Banne	29	1,5
Zak Zizopolous	Safety Officer	IPRH	2.5	1,2,3,5,6,7,9
Garry Mauger	Mine Management	IPRH	35	1,2,3,4,5,6,7,8,9,10
Terry McDonald	Mine Surveyor	IPRH	27	1,2,3,4,5,7,9
Duncan Orr	Civil Engineer	IPRH	8	1,2,3,4,5,6,7,8,9,10
Bill Estrada	Mine Productions Manager	IPRH	25	5
Peter Sheridan	Supervisor	IPRH	33	3,5
Jayantha Fernando	Mine Hydrogeologist	IPRH	30	3,4,5,7,8

Name	Position/Role	Department/ Company	Industry years	MMH Attended
Sam Frankland	Mine Tech Electrician (HSR)	IPRH	7	6
Frank Meranti	Mine H&S officer	IPRH	6	7
Romeo Preziosa	Mine Ops FSO	IPRH	25	4,7
Tony Vuillermin	Mine Maint Planner	Belle Banne	25	3,4,7
Russell Mills	Facilitator	GHD	28	1,2,3,4,5,6,7,8,9,10
Vish Khera	Co-Facilitator	GHD	1	1,2,3,4,5,6,7,8,9,10

2.5 Critical Control Selection & Adequacy

Critical Controls for MMHs fell into 2 categories –

- Risk Controls
- Critical System Controls

An explanation of each category is provided in Table 4.

Table 4 Critical Control Type

Risk Control	Critical System Control
Engineering controls execute automatically and do not require human intervention. Engineering-based controls may include both hardware and automated IT-based controls. Engineering controls are designed to achieve a specific repeatable level of control to a set level of availability. Reliability of engineering controls is achieved through the management system surrounding the ongoing review and improvement of the controls performance	System-based controls are executed by individuals within the bounds of a management system. Execution is based on a prescribed approach either as a common practice or as a defined procedure and in some instances, input from people is governed by system-set rules and protocols. Control reliability is achieved through the system surrounding the control, including management review and follow-up.

Due to high reliance on critical controls to manage MMH risks a robust approach to assessing this adequacy must be applied. The assessment of critical control adequacy addresses four characteristics of the control:

- Dependability
- Practicality
- Monitoring
- Workforce Involvement

2.6 Performance Standard Template development

Risk assessment alone does not manage risk. To improve and sustain safety at a site requires implementation and maintenance of critical controls identified during the safety assessments.

Performance standards are designed to set out a systematic and detailed definition of critical controls, which can then be audited to ensure their effectiveness in managing the MMH for which they were

identified.

The key parameters recorded in the performance standard were aligned with the Adequacy Assessment prompts.

For the performance standard to be beneficial each of these factors must be verifiable, to enable performance of the critical control to be tracked over time. The performance standards are designed to be a living document and should be updated / altered as necessary to reflect the requirements of the controls and any changes that may occur over time.

2.7 Database

The information gathered during the analysis was collected using a Microsoft Access risk register database designed specifically for semi-quantitative risk analysis by GHD. The risk register, which enables all the risk information to be centrally and conveniently located, can also be used to generate reports and charts of various outputs from the process. It will be delivered to site at the completion of the process for use as a reference tool and to assist in tracking and monitoring potential controls.

3. Interim Findings for Major Mining Hazards

3.1 Description of Major Mining Hazards

A review of the Hazelwood Hazard and Risk Register was conducted on 13 November 2009. Attendees are shown in Table 5.

Table 5 MMH Hazelwood review attendance list

Name	Position/Role	Department/ Company	Industry years
Peter Brimblecombe	Asset Manager,Maint	IPRH	30
Zak Zizopolous	Safety Officer	IPRH	2.5
Garry Mauger	Mine Management	IPRH	35
Duncan Orr	Civil Engineer	IPRH	8
Jayantha Fernando	Mine Hydrogeologist	IPRH	30
Richard Polmear			

The attendees reviewed the list of MMHs identified in the Hazards and Risk Register and confirmed the list of MMHs shown in Table 6. below. These MMHs are to be carried forward into the study.

Table 6 Descriptions of MMHs

MMH No	Title	Description
1.	Confined Spaces	A pathway to the MMH arises through exposure to engulfment by coal in the Raw Coal Bunker or by drowning when maintenance work is being undertaken in water tanks or water mains. Another pathway arises when personnel enter a confined space and are exposed to an unsafe atmosphere, through a lack of oxygen, presence of contaminants or there is an explosive atmosphere from coal dust. Temperature excesses were considered, but rejected because multiple fatality outcomes were not considered credible.

MMH No	Title	Description
2.	Mobile Plant Interactions	Mobile plant consists of: • Dozers; • Graders; • Dredgers / Stackers; • Slew Conveyors; • Heavy dump trucks; • Excavators; • Drill Rigs; • Cranes; • EWPs; and • Forklifts A pathway to the MMH arises from collisions between mobile plant on the mine roads and surfaces caused by poor visibility, road surfaces or operator condition. A second pathway is from the toppling of a crane or EWP arises from mechanical or electrical failures, collisions with other plant, working on unstable or uneven ground or working in extreme weather conditions A pathway involving the collision of the Dredger cabin with the batters was considered but rejected
3.	Dredger / Stacker Collapse	Collapse of a Dredger / Stacker. Pathways to the MMH include operating outside the design limits of the machines and/or mining methods, a mechanical/structural failure during operation, a batter collapse onto/below the Dredger / Stacker or a dump slip. Collisions with heavy plant or coalfaces were considered but rejected because multiple fatalities on the Dredger / Stacker are not considered credible. Collapses due to digging in soft formations was also rejected as a credible multiple fatality pathway.
4.	Jacking of Plant	Personnel involved in jacking of plant, maintenance activities. Pathways to the MMH are a failure of the jacking equipment, ground failure, or procedure/process failure during jacking of plant, jacking during extreme weather conditions or an error in the jacking methods used.

MMH No	Title	Description
5.	Vehicle Interactions	Light vehicles consist of: ◗ Cars and 4WDs; ◗ Forklifts; ◗ Tractors; ◗ Bobcats; ◗ Fire trucks; ◗ Maintenance trucks; and ◗ Vehicles with trailers Collisions or interactions involving light vehicles with heavy plant, other light vehicles or pedestrians in the mine area, mine roads and surfaces. Pathways to the MMH include road conditions, vehicle condition, and driver error.
6.	Exposure to Electricity	HV electricity exposure involving: ◗ Overhead power lines; ◗ Trailing cables; ◗ HV equipment; ◗ SP Ausnet 22 kV and 6.6 kV equipment; and ◗ Substations (4) Pathways to the MMH via HV include interaction with overhead powerlines, a failure in the trailing cable and interactions with HV equipment. A pathway to the MMH via LV is working on or in the vicinity of live LV equipment.
7.	Mine Fire	A mine fire with the potential to cause multiple fatalities may arise from maintenance (hot) work, individuals (e.g. smoking), external fires impacting on the mine, spontaneous combustion of reactive coal, and from a range of ignition sources where there are combustibles (coal, coal dust) or flammables (liquids and gases).
8.	Batter Failure (Engulfment or fall from heights)	Batter failures leading to engulfment by materials, or falls from height, occurring in the vicinity of batters. Pathways to the MMH include operator errors, geotechnical failures or environmental factors affecting the batter stability.

MMH No	Title	Description
9.	Falling Materials and Loads (Gravity)	Personnel are exposed when working in the vicinity of plant to falling materials including coal spills or falling objects. Pathways to the MMH include coal spills from overhead conveyors, and transfer points. Another pathway involving falling materials is the ingress of water or coal slurry into the Raw Coal Bunker, engulfing personnel. A pathway involving gravity is loads being dropped from cranes during planned activities.
10.	Structural Failure of Fixed Structures	Fixed structures include: ◗ Rising conveyors; ◗ Tension carriages; ◗ Transfer points; ◗ Bridges & tunnels; ◗ Reinforced earth structures ◗ The Hazelwood Slot Bunker; and ◗ Towers (fire, communications, transmission) The pathways to the MMH involving structural failure include failure of structures, mechanical failures, mobile plant interaction with the structures and external factors.

Several potential MMHs were considered, but were rejected based on discussions held by Hazelwood personnel in a MMH scoping meeting. These rejected hazards, with reasons for rejection are shown in Table 7 below.

Table 7 Other MMHs considered

Hazard	Title	Description	Reason for Rejection
9	Inrush of Water in Mine (Flooding)	Flooding in mine from extreme weather events or groundwater release	• 1 in 10,000 year flood protection from river • Inflows from main drain failure too small to create inrush • Inflows from catchments or drain failures unlikely to have sufficient volumes to cause fatality.

Hazard	Title	Description	Reason for Rejection
11	Earthworks Failure (Engulfment)	Collapse of trenches, drains, bores or fire holes during work activities	• Only a single fatality circumstance can be conceived as even remotely a possibility.
13	Flammable Gases	Release of flammable gases in the workshop with ignition	• Gas volumes (acetylene) are low amounting to one bottle at a time. • Potential for a fatality most unlikely, let alone a multiple fatality.

3.2 Bow-ties

The MMH workshops reviewed each bow-tie in detail. There was considerable discussion on many of the credible 'risk scenarios' and active discussion on the controls. Prior to this discussion the nature of the MMH was discussed to ensure that all the team had a clear understanding of the MMH. The reviewed bow-tie diagrams are shown in Appendix A.

3.3 Critical Controls

A total of 55 Critical controls were selected for all of the MMHs on the Bow Tie diagrams and were either:

- Engineering based Risk Controls (33 Controls)
- System Based (22 Controls)

These controls should receive the highest level of scrutiny and ongoing management attention to ensure that their effectiveness is maintained. The selections were based around discussions held by the team and personnel opinions on which controls were instrumental in preventing the respective multiple fatality event. Preference was given to 'Risk Controls' due to their engineering nature and lack of reliance on human factors and systems.

The identified Critical controls are listed in Table 8.

Table 8 Critical System & Risk Controls

MMH	Risk/Critical System Controls (R/CS)
Confined Spaces	0005 Emergency Response Plan (2895) (CS) 0318 Physical Isolation of tanks eg. Handrails/guarding, Lockable valves (R) 0090 Procedure - Mine Registered & Confined Space including Confined Space Register/Permit System (3090) (CS) 0213 Mine Permit System (CS) 0145 Design - Raw Coal Bunker (eg. personnel guarding) (R)
Mobile Plant Interactions	0005 Emergency Response Plan (2895) (CS) 0326 Major haul roads conforming with standards (R) 0229 Mobile Equipment - Fit for purpose (Cab layout & design, Failsafe controls) (R) 0236 Load Monitoring/limiting devices (R) 0113 ROPs on Mining plant where fitted (R) 0148 Exclusion zone around plant (R)

MMH	Risk/Critical System Controls (R/CS)
Dredger/Stacker Collapse	0028 Weekly Geotechnical Inspections (CS) 0030 Depressurisation of aquifers & Groundwater Modelling (CS) 0032 Surface drainage (R) 0044 Dump design (height) (R) 0257 Safety limits on Machinery (R) 0412 Design - Dredger/Stacker eg. Safety hooks (R) 0469 Monitoring: On-line bore output (CS)
Jacking of Plant	0005 Emergency Response Plan (2895) (CS) 0238 External testing of jacking equipment (CS) 0137 Engineer Approved Procedures – Jacking (CS) 0138 Jack design & failsafe devices (eg. Pilot operated check valves) (R) 0148 Exclusion zone around plant (R)
Vehicle Interactions	0340 Design - Fit for purpose vehicle (light vehicle/forklifts/scissor lifts/bobcats/firetrucks/trailers) (R) 0129 Preventative Maintenance Program (CS) 0164 Design – Roadways (R)
Exposure to Electricity	0011 HV Routine Maintenance program (CS) 0012 Design - HV Switching Equipment (R) 0016 Design & Layout – Cables (R) 0021 Restricted access to authorised personnel (locks & signs) (CS) 0187 Limits of approach to be maintained around HV Plant (R) 0270 Electrical Protection Systems (R) 0376 HV Electrical protection systems (Sensitive earth leakage protection/IT earthing system) (R) 0386 Procedure - Isolation/Earthing (CS) 0388 Isolation & Earths (R) 0391 Procedure - HV Switching (CS)

MMH	Risk/Critical System Controls (R/CS)
Mine Fire	0005 Emergency Response Plan (2895) (CS) 0062 Maintenance - Daily cleaning or on request (hose down / shovel clean) (CS) 0064 Procedure - Permit System (Hot work) (CS) 0293 Equipment Protection Devices (R) 0151 Shiftly Fault inspections (CS) 0468 Mine Fire Services Policy & Code of Practice (CS) 0470 Fire Instructions (CS)
Batter Failure (Engulfment or fall from heights)	0005 Emergency Response Plan (2895) (CS) 0028 Weekly Geotechnical Inspections (CS) 0030 Depressurisation of aquifers & Groundwater Modelling (CS) 0032 Surface drainage (R) 0154 Horizontal bores (relief bores) 0448 Design – Batter (R)
Falling Materials and loads (gravity)	0299 Safety devices (Dredgers) & (H/E Unit) 0184 Design - Conveyor systems (chute size, gradient, loading) (R) 0213 Mine Permit System (CS) 0168 Design/Selection - Rigging Equipment (R) 0169 Design - Crane including safety devices (R) 0170 Procedure - Independent assessment & Inspection of rigging equipment (CS) 0458 Design - Lifting Points on equipment (R) 0463 Belt Clamps, chains & certified beams (R) 0464 Procedure - Belt clamping & creating a belt envelope (CS)

MMH	Risk/Critical System Controls (R/CS)
Structural failure of fixed structures	0005 Emergency Response Plan (2895) (CS) 0028 Weekly Geotechnical Inspections (CS) 0345 Design - Structures including material selection & corrosion protection (R) 0352 Procedure - Maintenance for fixed structures including inspection routine (CS) 0355 Design - Structures including limits and protection devices (R) 0369 Over tension protection devices (R) 0251 Civil Asset Management Plan including routine inspections (CS) 0150 Design - Conveyor (braking systems/shutdown/belt failure detection devices) (R)

3.4 Performance Standards

As part of the development of the Performance Standard for a critical control an assessment of its adequacy is required. A number of the critical controls identified in the 2004 study were assessed for their adequacy using the prompts:

- Dependability
- Practicality
- Monitoring
- Workforce Involvement

Checklists provided the relevant criteria for each of these prompts. This approach will now be required for new critical controls identified in this study and verification that adequacy assessments of critical controls reviewed in the 2004 study are still valid. The performance standards also identify improvement actions and owners. Preliminary sample performance standards were developed for Hazelwood mine and are included in Appendix C.

4. Further Work

4.1 Risk Assessment of Scenarios

Risk assessments are to be be carried out for each of the scenarios for the MMHs illustrating that risk has been reduced to as low as reasonably practicable. Discussions with Hazelwood Mine management are continuing to determine the most appropriate method to complete the risk assessment.

4.2 Performance Standards

To improve and sustain safety at a site requires implementation and maintenance of critical controls identified during the safety assessments. It is anticipated that Hazelwood mine will endeavour to develop performance standards around each of the Critical System and Risk Controls identified during the safety assessment workshops. As part of the development of the performance standard an assessment of the current adequacy of the critical control will be required.

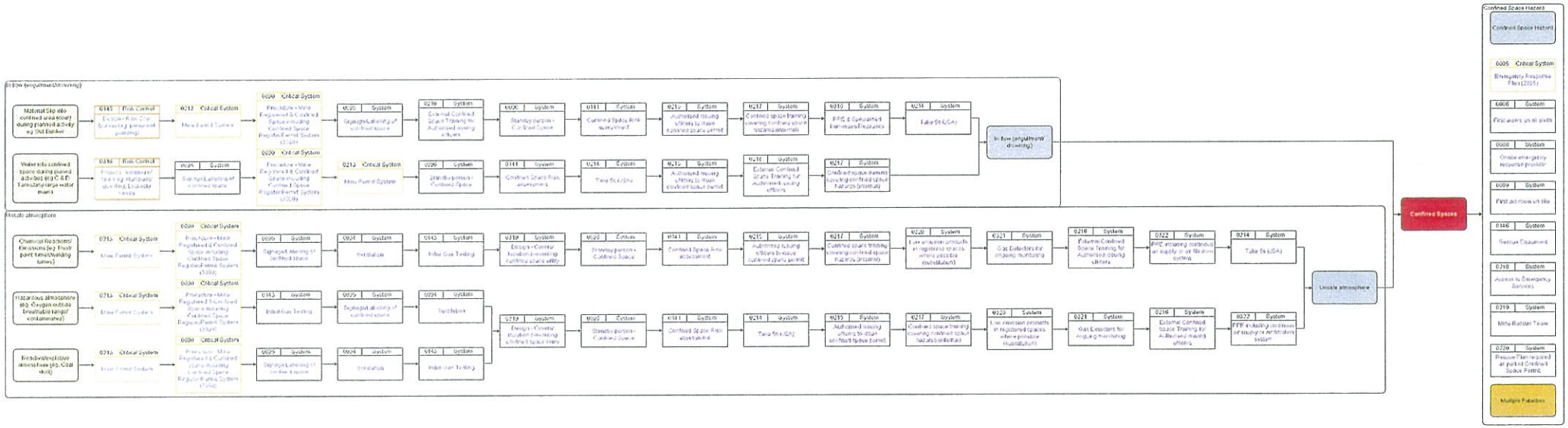
GHD will faciitate further workshops to assist Hazelwood Mine personnel draw up these performance standards. Sample performance standards have been issued to site (Appendix C) to assist with familiarisation.

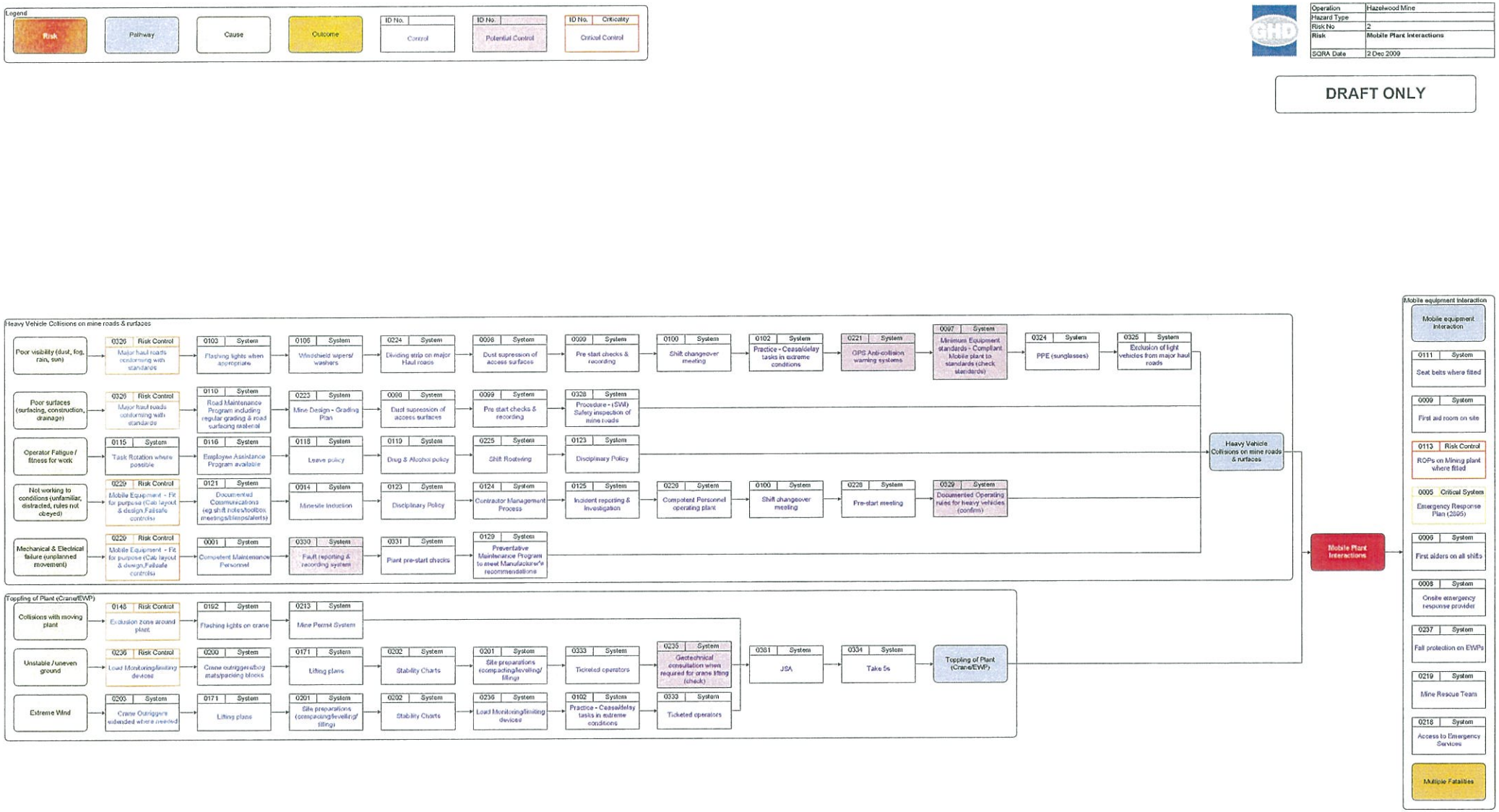
Appendix A

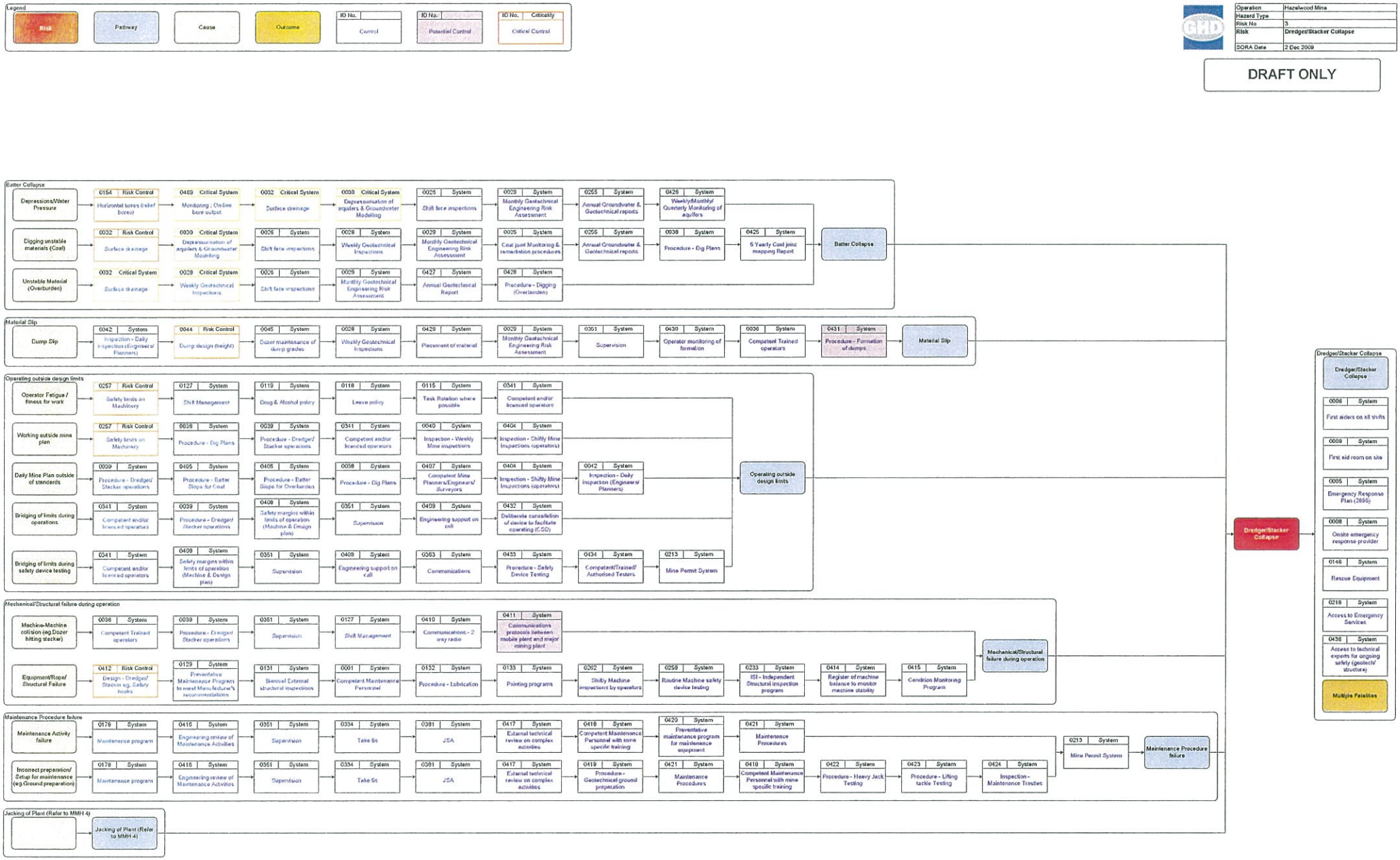
Bow ties

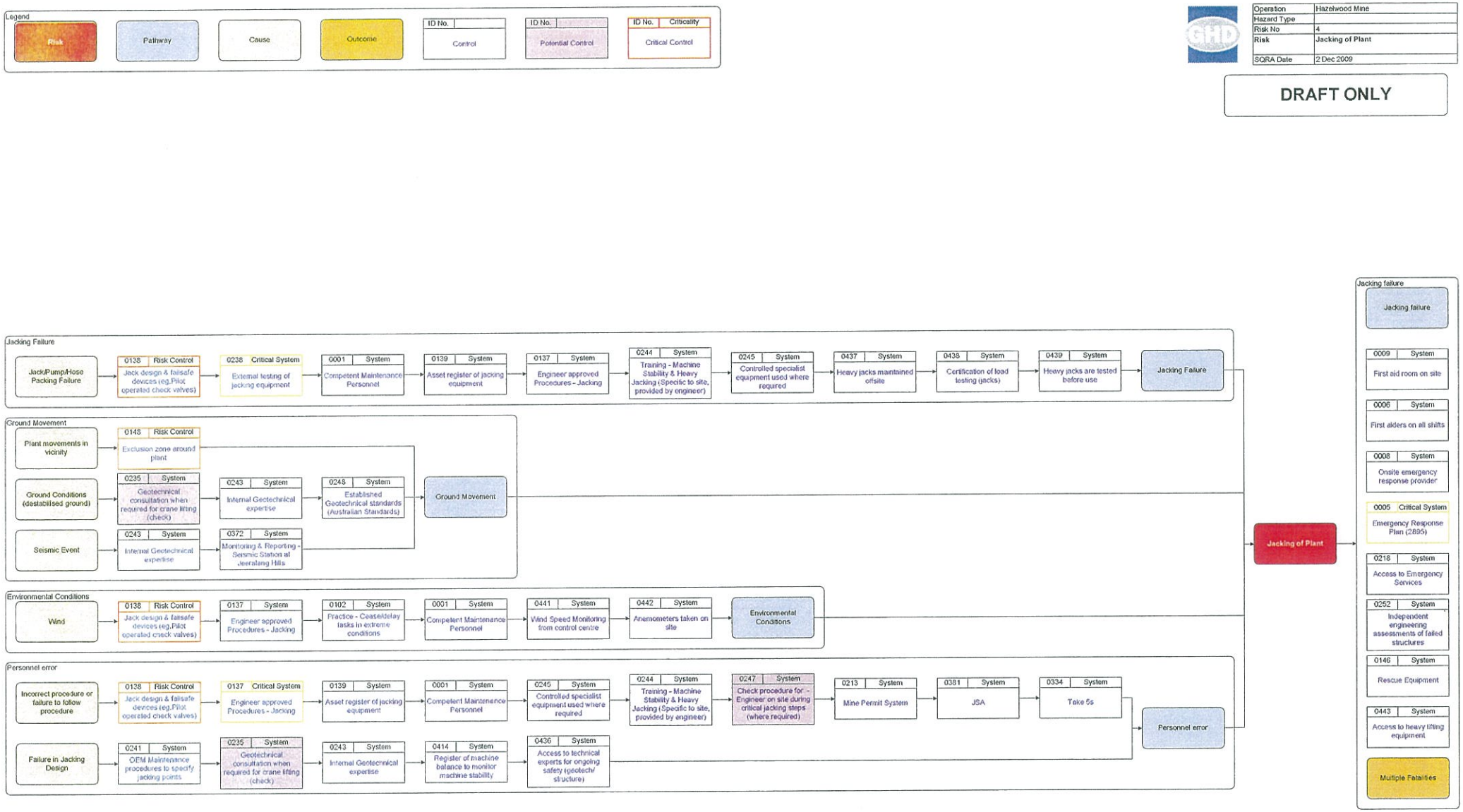
Operations	Hazelwood Mine
Hazard Type	
Risk No	1
Risk	Confined Spaces
SQRA Date	2 Dec 2009

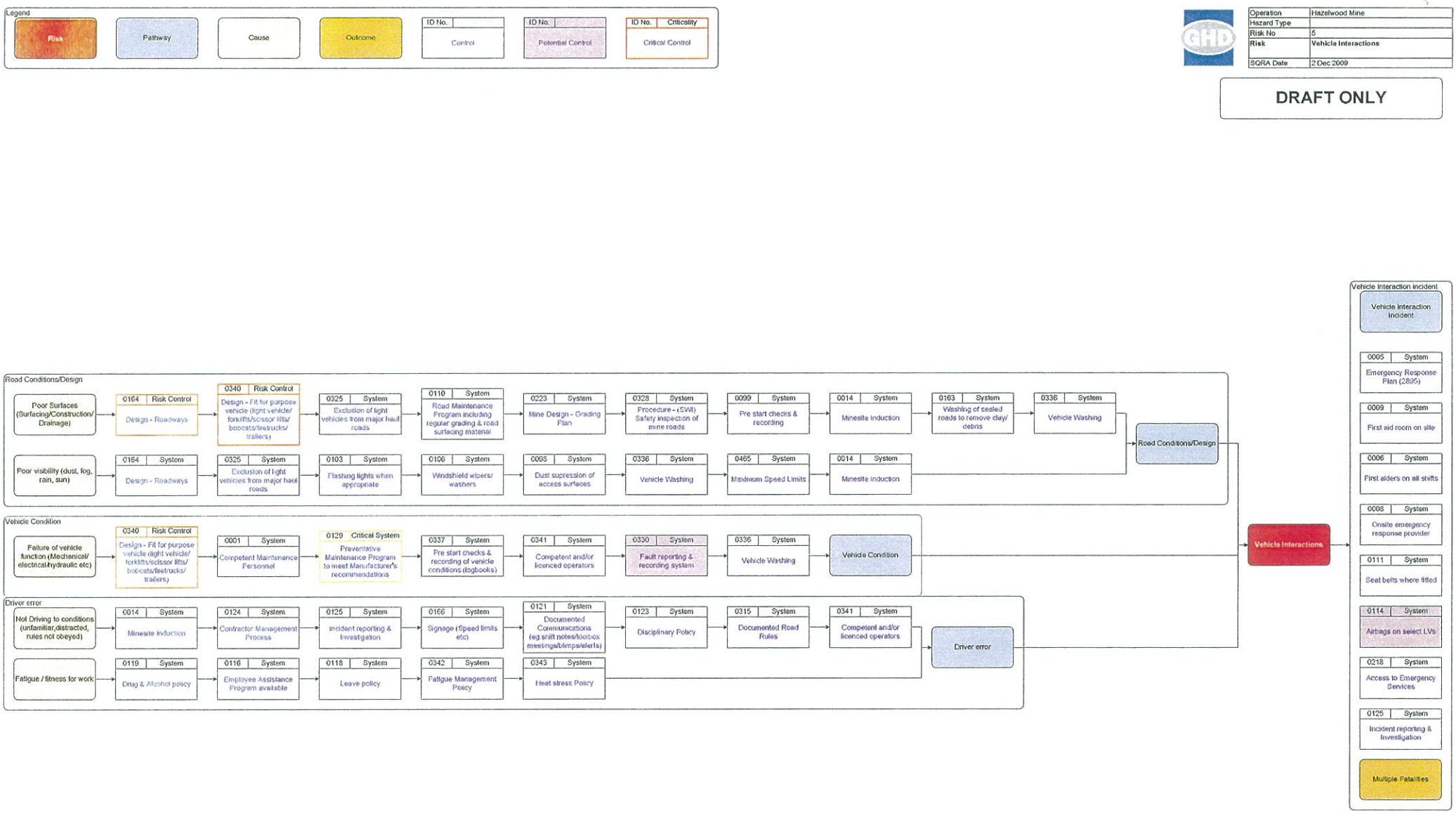
DRAFT ONLY

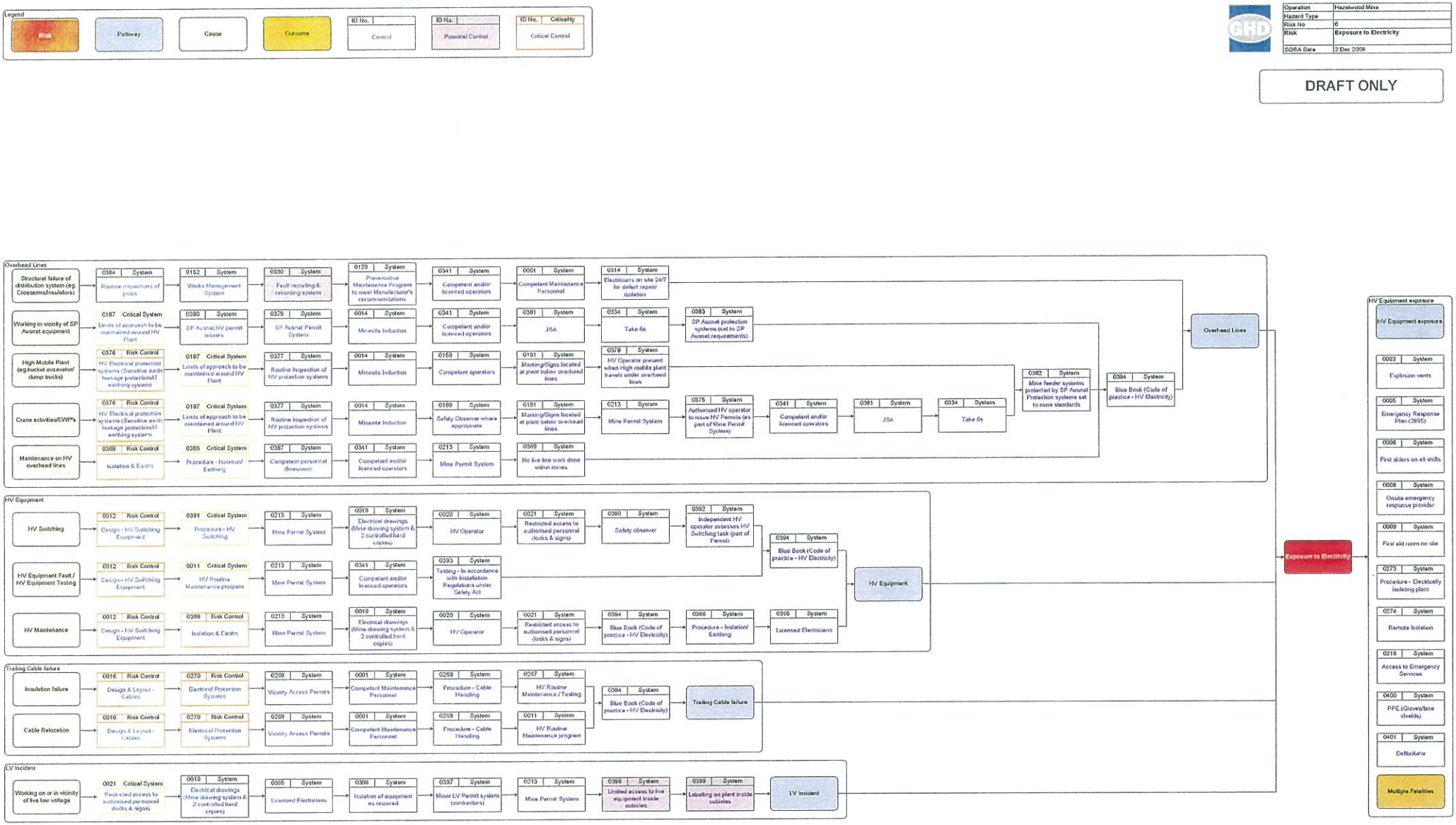



Legend
Risk
Pathway
Cause
Outcome
ID No.
Control
ID No.
Potential Control
ID No. Criticality
Critical Control
Operation Hazelwood Mine
Hazard Type
Risk No 2
Risk Mobile Plant Interactions
SQRA Date 2 Dec 2009
DRAFT ONLY
Heavy Vehicle Collisions on mine roads & surfaces
Poor visibility (dust, fog, rain, sun)
0326 Risk Control Major haul roads conforming with standards
0103 System Flashing lights when appropriate
0106 System Windshield wipers/ washers
0224 System Dividing strip on major Haul roads
0098 System Dust supression of access surfaces
0009 System Pre start checks & recording
0100 System Shift changeover meeting
0102 System Practice - Cease/delay tasks in extreme conditions
0221 System OPS Anti-collision warning systems
0097 System Minimum Equipment standards - Compliant Mobile plant to standards (check standards)
0324 System PPE (sunglasses)
0325 System Exclusion of light vehicles from major haul roads
Poor surfaces (surfacing, construction, drainage)
0326 Risk Control Major haul roads conforming with standards
0110 System Road Maintenance Program including regular grading & road surfacing material
0223 System Mine Design - Grading Plan
0098 System Dust supression of access surfaces
0099 System Pre start checks & recording
0328 System Procedure - (SW) Safety inspection of mine roads
Operator Fatigue / fitness for work
0115 System Task Rotation where possible
0116 System Employee Assistance Program available
0118 System Leave policy
0119 System Drug & Alcohol policy
0225 System Shift Rostering
0123 System Disciplinary Policy
Not working to conditions (unfamiliar, distracted, rules not obeyed)
0229 Risk Control Mobile Equipment - Fit for purpose (Cab layout & design,Failsafe controls)
0121 System Documented Communications (eg:shift notes/toolbox meetings/bleeps/alerts)
0014 System Minesite Induction
0123 System Disciplinary Policy
0124 System Contractor Management Process
0125 System Incident reporting & investigation
0229 System Competent Personnel operating plant
0100 System Shift changeover meeting
0228 System Pre-start meeting
0329 System Documented Operating rules for heavy vehicles (confirm)
Mechanical & Electrical failure (unplanned movement)
0229 Risk Control Mobile Equipment - Fit for purpose (Cab layout & design,Failsafe controls)
0001 System Competent Maintenance Personnel
0330 System Fault reporting & recording system
0331 System Plant pre-start checks
0129 System Preventative Maintenance Program to meet Manufacturer's recommendations
Heavy Vehicle Collisions on mine roads & surfaces
Toppling of Plant (Crane/EWP)
Collisions with moving plant
0148 Risk Control Exclusion zone around plant
0192 System Flashing lights on crane
0213 System Mine Permit System
Unstable / uneven ground
0236 Risk Control Load Monitoring/limiting devices
0200 System Crane outriggers/big mats/packing blocks
0171 System Lifting plans
0202 System Stability Charts
0201 System Site preparations (compacting/levelling/ filling)
0333 System Ticketed operators
0235 System Geotechnical consultation when required for crane lifting (check)
0361 System JSA
0334 System Take 5s
Toppling of Plant (Crane/EWP)
Extreme Wind
0203 System Crane Outriggers extended where needed
0171 System Lifting plans
0201 System Site preparations (compacting/levelling/ filling)
0202 System Stability Charts
0236 System Load Monitoring/limiting devices
0102 System Practice - Cease/delay tasks in extreme conditions
0333 System Ticketed operators
Mobile Plant Interactions
Mobile equipment interaction
Mobile equipment interaction
0111 System Seat belts where fitted
0009 System First aid room on site
0113 Risk Control ROPs on Mining plant where fitted
0005 Critical System Emergency Response Plan (2005)
0006 System First aiders on all shifts
0008 System Onsite emergency response provider
0237 System Fall protection on EWPs
0219 System Mine Rescue Team
0218 System Access to Emergency Services
Multiple Fatalities


Legend
Risk
Pathway
Cause
Outcome
ID No. Control
ID No. Potential Control
ID No. Criticality Critical Control
Operation Hazelwood Mine
Hazard Type
Risk No 3
Risk Dredger/Stacker Collapse
SORA Date 2 Dec 2009
DRAFT ONLY
Batter Collapse
Depressions/Water Pressure
0154 Risk Control Horizontal bores (relief bores)
0469 Critical System Monitoring : On-line bore output
0032 Critical System Surface drainage
0030 Critical System Depressurisation of aquifers & Groundwater Modelling
0025 System Shift face inspections
0029 System Monthly Geotechnical Engineering Risk Assessment
0255 System Annual Groundwater & Geotechnical reports
0426 System Weekly/Monthly/ Quarterly Monitoring of aquifers
Digging unstable materials (Coal)
0032 Risk Control Surface drainage
0030 Critical System Depressurisation of aquifers & Groundwater Modelling
0026 System Shift face inspections
0028 System Weekly Geotechnical Inspections
0029 System Monthly Geotechnical Engineering Risk Assessment
0025 System Coal joint Monitoring & remediation procedures
0255 System Annual Groundwater & Geotechnical reports
0038 System Procedure - Dig Plans
0425 System 5 Yearly Coal joint mapping Report
Batter Collapse
Unstable Material (Overburden)
0032 Critical System Surface drainage
0029 Critical System Weekly Geotechnical Inspections
0026 System Shift face inspections
0029 System Monthly Geotechnical Engineering Risk Assessment
0427 System Annual Geotechnical Report
0428 System Procedure - Digging (Overburden)
Material Slip
Dump Slip
0042 System Inspection - Daily Inspection (Engineers/ Planners)
0044 Risk Control Dump design (height)
0045 System Dozer maintenance of dump grades
0028 System Weekly Geotechnical Inspections
0429 System Placement of material
0029 System Monthly Geotechnical Engineering Risk Assessment
0351 System Supervision
0430 System Operator monitoring of formation
0036 System Competent Trained operators
0431 System Procedure - Formation of dumps
Material Slip
Operating outside design limits
Operator Fatigue / fitness for work
0257 Risk Control Safety limits on Machinery
0127 System Shift Management
0119 System Drug & Alcohol policy
0118 System Leave policy
0115 System Task Rotation where possible
0341 System Competent and/or licensed operators
Working outside mine plan
0257 Risk Control Safety limits on Machinery
0038 System Procedure - Dig Plans
0039 System Procedure - Dredger/ Stacker operations
0341 System Competent and/or licensed operators
0040 System Inspection - Weekly Mine Inspections
0404 System Inspection - Shiftly Mine Inspections (operators)
Daily Mine Plan outside of standards
0039 System Procedure - Dredger/ Stacker operations
0405 System Procedure - Batter Slope for Coal
0406 System Procedure - Batter Slope for Overburden
0038 System Procedure - Dig Plans
0407 System Competent Mine Planners/Engineers/ Surveyors
0404 System Inspection - Shiftly Mine Inspections (operators)
0042 System Inspection - Daily Inspection (Engineers/ Planners)
Bridging of limits during operations
0341 System Competent and/or licensed operators
0039 System Procedure - Dredger/ Stacker operations
0408 System Safety margins within limits of operation (Machine & Design plan)
0351 System Supervision
0409 System Engineering support on call
0432 System Deliberate cancellation of device to facilitate operating (C:SO)
Operating outside design limits
Bridging of limits during safety device testing
0341 System Competent and/or licensed operators
0408 System Safety margins within limits of operation (Machine & Design plan)
0351 System Supervision
0409 System Engineering support on call
0363 System Communications
0433 System Procedure - Safety Device Testing
0434 System Competent/Trained/ Authorised Testers
0213 System Mine Permit System
Mechanical/Structural failure during operation
Machine-Machine collision (eg.Dozer hitting stacker)
0036 System Competent Trained operators
0039 System Procedure - Dredger/ Stacker operations
0351 System Supervision
0127 System Shift Management
0410 System Communications - 2 way radio
0411 System Communications protocols between mobile plant and major mining plant
Equipment/Rope/ Structural Failure
0412 Risk Control Design - Dredger/ Stacker eg. Safety hooks
0129 System Preventative Maintenance Program to meet Manufacturer's recommendations
0131 System Biennial External structural inspections
0001 System Competent Maintenance Personnel
0132 System Procedure - Lubrication
0133 System Painting programs
0262 System Shiftly Machine inspections by operators
0258 System Routine Machine safety device testing
0233 System ISI - Independent Structural inspection program
0414 System Register of machine balance to monitor machine stability
0415 System Condition Monitoring Program
Mechanical/Structural failure during operation
Maintenance Procedure failure
Maintenance Activity failure
0178 System Maintenance program
0416 System Engineering review of Maintenance Activities
0351 System Supervision
0334 System Take 5s
0391 System JSA
0417 System External technical review on complex activities
0418 System Competent Maintenance Personnel with mine specific training
0420 System Preventative maintenance program for maintenance equipment
0421 System Maintenance Procedures
Incorrect preparation/ Setup for maintenance (eg.Ground preparation)
0178 System Maintenance program
0416 System Engineering review of Maintenance Activities
0351 System Supervision
0334 System Take 5s
0391 System JSA
0417 System External technical review on complex activities
0419 System Procedure - Geotechnical ground preparation
0421 System Maintenance Procedures
0418 System Competent Maintenance Personnel with mine specific training
0422 System Procedure - Heavy Jack Testing
0423 System Procedure - Lifting tackle Testing
0424 System Inspection - Maintenance Trestles
0213 System Mine Permit System
Maintenance Procedure failure
Jacking of Plant (Refer to MMH 4)
Jacking of Plant (Refer to MMH 4)
Dredger/Stacker Collapse
Dredger/Stacker Collapse
0006 System First aiders on all shifts
0009 System First aid room on site
0005 System Emergency Response Plan (2699)
0008 System Onsite emergency response provider
0146 System Rescue Equipment
0218 System Access to Emergency Services
0438 System Access to technical experts for ongoing safety (geotech/ structural)
Multiple Fatalities

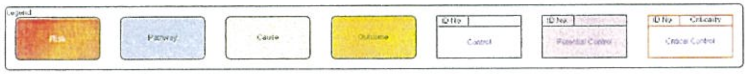

Legend
Risk
Pathway
Cause
Outcome
ID No.
Control
ID No.
Potential Control
ID No. Criticality
Critical Control
Operation Hazelwood Mine
Hazard Type
Risk No 4
Risk Jacking of Plant
SQRA Date 2 Dec 2009
DRAFT ONLY
Jacking Failure
Jack/Pump/Hose Packing Failure
0138 Risk Control
Jack design & failsafe devices (eg.Pilot operated check valves)
0238 Critical System
External testing of jacking equipment
0001 System
Competent Maintenance Personnel
0139 System
Asset register of jacking equipment
0137 System
Engineer approved Procedures - Jacking
0244 System
Training - Machine Stability & Heavy Jacking (Specific to site, provided by engineer)
0245 System
Controlled specialist equipment used where required
0437 System
Heavy jacks maintained offsite
0438 System
Certification of load testing (jacks)
0439 System
Heavy jacks are tested before use
Jacking Failure
Ground Movement
Plant movements in vicinity
0148 Risk Control
Exclusion zone around plant
Ground Conditions (destabilised ground)
0235 System
Geotechnical consultation when required for crane lifting (check)
0243 System
Internal Geotechnical expertise
0248 System
Established Geotechnical standards (Australian Standards)
Ground Movement
Seismic Event
0243 System
Internal Geotechnical expertise
0372 System
Monitoring & Reporting - Seismic Station at Jeeralang Hills
Environmental Conditions
Wind
0138 Risk Control
Jack design & failsafe devices (eg.Pilot operated check valves)
0137 System
Engineer approved Procedures - Jacking
0102 System
Practice - Cease/delay tasks in extreme conditions
0001 System
Competent Maintenance Personnel
0441 System
Wind Speed Monitoring from control centre
0442 System
Anemometers taken on site
Environmental Conditions
Personnel error
Incorrect procedure or failure to follow procedure
0138 Risk Control
Jack design & failsafe devices (eg.Pilot operated check valves)
0137 Critical System
Engineer approved Procedures - Jacking
0139 System
Asset register of jacking equipment
0001 System
Competent Maintenance Personnel
0245 System
Controlled specialist equipment used where required
0244 System
Training - Machine Stability & Heavy Jacking (Specific to site, provided by engineer)
0247 System
Check procedure for - Engineer on site during critical jacking steps (where required)
0213 System
Mine Permit System
0381 System
JSA
0334 System
Take 5s
Personnel error
Failure in Jacking Design
0241 System
OEM Maintenance procedures to specify jacking points
0235 System
Geotechnical consultation when required for crane lifting (check)
0243 System
Internal Geotechnical expertise
0414 System
Register of machine balance to monitor machine stability
0436 System
Access to technical experts for ongoing safety (geotech/ structure)
Jacking of Plant
Jacking failure
Jacking failure
0009 System
First aid room on site
0006 System
First aiders on all shifts
0008 System
Onsite emergency response provider
0005 Critical System
Emergency Response Plan (2895)
0218 System
Access to Emergency Services
0252 System
Independent engineering assessments of failed structures
0146 System
Rescue Equipment
0443 System
Access to heavy lifting equipment
Multiple Fatalities

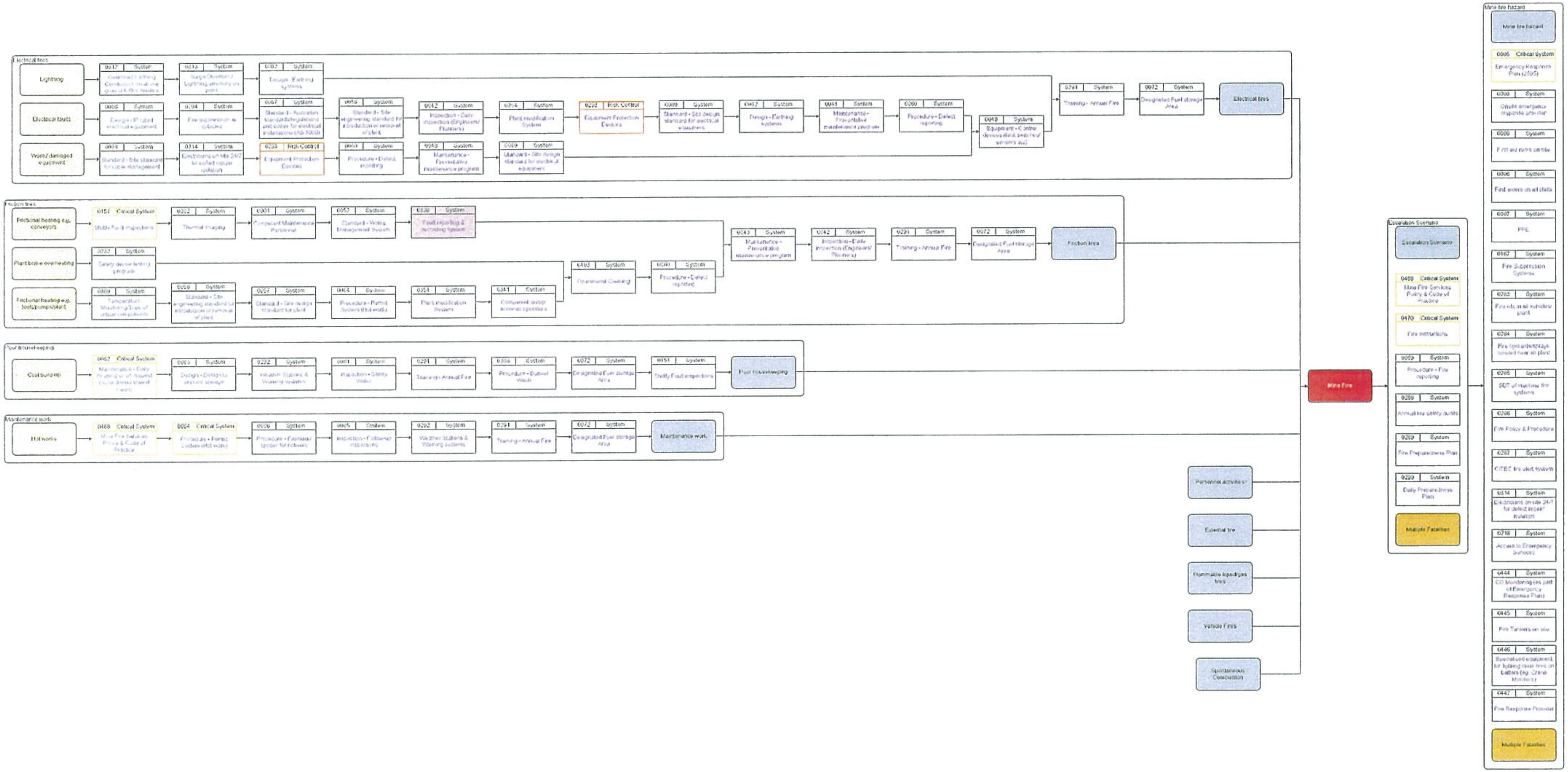

Legend
Risk
Pathway
Cause
Outcome
ID No.
Control
ID No.
Potential Control
ID No. Criticality
Critical Control
Operation Hazelwood Mine
Hazard Type
Risk No 5
Risk Vehicle Interactions
SQRA Date 2 Dec 2009
DRAFT ONLY
Road Conditions/Design
Poor Surfaces (Surfacing/Construction/ Drainage)
0164 Risk Control
Design - Roadways
0340 Risk Control
Design - Fit for purpose vehicle (light vehicle/ forklifts/scissor lifts/ bobcats/firetrucks/ trailers)
0325 System
Exclusion of light vehicles from major haul roads
0110 System
Road Maintenance Program including regular grading & road surfacing material
0223 System
Mine Design - Grading Plan
0328 System
Procedure - (SWI) Safety inspection of mine roads
0099 System
Pre start checks & recording
0014 System
Minesite Induction
0163 System
Washing of sealed roads to remove clay/ debris
0336 System
Vehicle Washing
Poor visibility (dust, fog, rain, sun)
0164 System
Design - Roadways
0325 System
Exclusion of light vehicles from major haul roads
0103 System
Flashing lights when appropriate
0106 System
Windshield wipers/ washers
0098 System
Dust supression of access surfaces
0336 System
Vehicle Washing
0465 System
Maximum Speed Limits
0014 System
Minesite Induction
Road Conditions/Design
Vehicle Condition
Failure of vehicle function (Mechanical/ electrical/hydraulic etc)
0340 Risk Control
Design - Fit for purpose vehicle (light vehicle/ forklifts/scissor lifts/ bobcats/firetrucks/ trailers)
0001 System
Competent Maintenance Personnel
0129 Critical System
Preventative Maintenance Program to meet Manufacturer's recommendations
0337 System
Pre start checks & recording of vehicle conditions (logbooks)
0341 System
Competent and/or licenced operators
0330 System
Fault reporting & recording system
0336 System
Vehicle Washing
Vehicle Condition
Driver error
Not Driving to conditions (unfamiliar,distracted, rules not obeyed)
0014 System
Minesite Induction
0124 System
Contractor Management Process
0125 System
Incident reporting & Investigation
0166 System
Signage (Speed limits etc)
0121 System
Documented Communications (eg.shift notes/toolbox meetings/bumps/alerts)
0123 System
Disciplinary Policy
0315 System
Documented Road Rules
0341 System
Competent and/or licenced operators
Fatigue / fitness for work
0119 System
Drug & Alcohol policy
0116 System
Employee Assistance Program available
0118 System
Leave policy
0342 System
Fatigue Management Policy
0343 System
Heat stress Policy
Driver error
Vehicle Interactions
Vehicle Interaction Incident
Vehicle Interaction Incident
0005 System
Emergency Response Plan (2895)
0009 System
First aid room on site
0006 System
First aiders on all shifts
0008 System
Onsite emergency response provider
0111 System
Seat belts where fitted
0114 System
Airbags on select LVs
0218 System
Access to Emergency Services
0125 System
Incident reporting & Investigation
Multiple Fatalities


Legend
Risk
Pathway
Cause
Outcome
ID No.
Control
ID No.
Potential Control
ID No.
Criticality
Critical Control
Operation
Hazelwood Mine
Hazard Type
Risk No
6
Risk
Exposure to Electricity
SORA Date
2 Dec 2009
DRAFT ONLY
Overhead Lines
Structural failure of distribution system (eg. Crossarms/insulators)
0384 System
Routine inspections of poles
0152 System
Works Management System
0330 System
Fault reporting & recording system
0129 System
Preventative Maintenance Program to meet Manufacturer's recommendations
0341 System
Competent and/or licenced operators
0001 System
Competent Maintenance Personnel
0314 System
Electricians on site 24/7 for defect repair/ isolation
Working in vicinity of SP Ausnet equipment
0187 Critical System
Limits of approach to be maintained around HV Plant
0380 System
SP Ausnet HV permit issuers
0378 System
SP Ausnet Permit System
0014 System
Minesite Induction
0341 System
Competent and/or licenced operators
0381 System
JSA
0334 System
Take 6s
0383 System
SP Ausnet protection systems (set to SP Ausnet requirements)
High Mobile Plant (eg.bucket excavator/ dump trucks)
0376 Risk Control
HV Electrical protection systems (Sensitive earth leakage protection/IT earthing system)
0187 Critical System
Limits of approach to be maintained around HV Plant
0377 System
Routine inspection of HV protection systems
0014 System
Minesite Induction
0158 System
Competent operators
0191 System
Marking/Signs located at plant below overhead lines
0379 System
HV Operator present when High mobile plant travels under overhead lines
Crane activities/EWPs
0376 Risk Control
HV Electrical protection systems (Sensitive earth leakage protection/IT earthing system)
0187 Critical System
Limits of approach to be maintained around HV Plant
0377 System
Routine inspection of HV protection systems
0014 System
Minesite Induction
0169 System
Safety Observer where appropriate
0191 System
Marking/Signs located at plant below overhead lines
0213 System
Mine Permit System
0375 System
Authorised HV operator to issue HV Permits (as part of Mine Permit System)
0341 System
Competent and/or licenced operators
0381 System
JSA
0334 System
Take 6s
0382 System
Mine feeder systems protected by SP Ausnet Protection systems set to more standards
0394 System
Blue Book (Code of practice - HV Electricity)
Maintenance on HV overhead lines
0388 Risk Control
Isolation & Earths
0386 Critical System
Procedure - Isolation/ Earthing
0387 System
Competent personnel (linesmen)
0341 System
Competent and/or licenced operators
0213 System
Mine Permit System
0369 System
No live line work done within mines
Overhead Lines
HV Equipment
HV Switching
0012 Risk Control
Design - HV Switching Equipment
0391 Critical System
Procedure - HV Switching
0213 System
Mine Permit System
0019 System
Electrical drawings (Mine drawing system & 2 controlled hard copies)
0020 System
HV Operator
0021 System
Restricted access to authorised personnel (locks & signs)
0360 System
Safety observer
0392 System
Independent HV operator assesses HV Switching task (part of Permit)
0394 System
Blue Book (Code of practice - HV Electricity)
HV Equipment Fault / HV Equipment Testing
0012 Risk Control
Design - HV Switching Equipment
0011 Critical System
HV Routine Maintenance program
0213 System
Mine Permit System
0341 System
Competent and/or licenced operators
0393 System
Testing - In accordance with Installation Regulations under Safety Act
HV Maintenance
0012 Risk Control
Design - HV Switching Equipment
0388 Risk Control
Isolation & Earths
0213 System
Mine Permit System
0019 System
Electrical drawings (Mine drawing system & 2 controlled hard copies)
0020 System
HV Operator
0021 System
Restricted access to authorised personnel (locks & signs)
0394 System
Blue Book (Code of practice - HV Electricity)
0386 System
Procedure - Isolation/ Earthing
0395 System
Licensed Electricians
HV Equipment
Trailing Cable failure
Insulation failure
0016 Risk Control
Design & Layout - Cables
0270 Risk Control
Electrical Protection Systems
0208 System
Vicinity Access Permits
0001 System
Competent Maintenance Personnel
0269 System
Procedure - Cable Handling
0267 System
HV Routine Maintenance / Testing
0394 System
Blue Book (Code of practice - HV Electricity)
Trailing Cable failure
Cable Relocation
0016 Risk Control
Design & Layout - Cables
0270 Risk Control
Electrical Protection Systems
0208 System
Vicinity Access Permits
0001 System
Competent Maintenance Personnel
0269 System
Procedure - Cable Handling
0011 System
HV Routine Maintenance program
LV Incident
Working on or in vicinity of live low voltage
0021 Critical System
Restricted access to authorised personnel (locks & signs)
0019 System
Electrical drawings (Mine drawing system & 2 controlled hard copies)
0395 System
Licensed Electricians
0396 System
Isolation of equipment as required
0397 System
Minor LV Permit system (contractors)
0213 System
Mine Permit System
0399 System
Limited access to live equipment inside cubicles
0398 System
Labelling on plant inside cubicles
LV Incident
Exposure to Electricity
HV Equipment exposure
HV Equipment exposure
0003 System
Explosion vents
0005 System
Emergency Response Plan (2895)
0006 System
First aiders on all shifts
0008 System
Onsite emergency response provider
0009 System
First aid room on site
0273 System
Procedure - Electrically isolating plant
0274 System
Remote Isolation
0218 System
Access to Emergency Services
0400 System
PPE (Gloves/face shields)
0401 System
Defibrillator
Multiple Fatalities

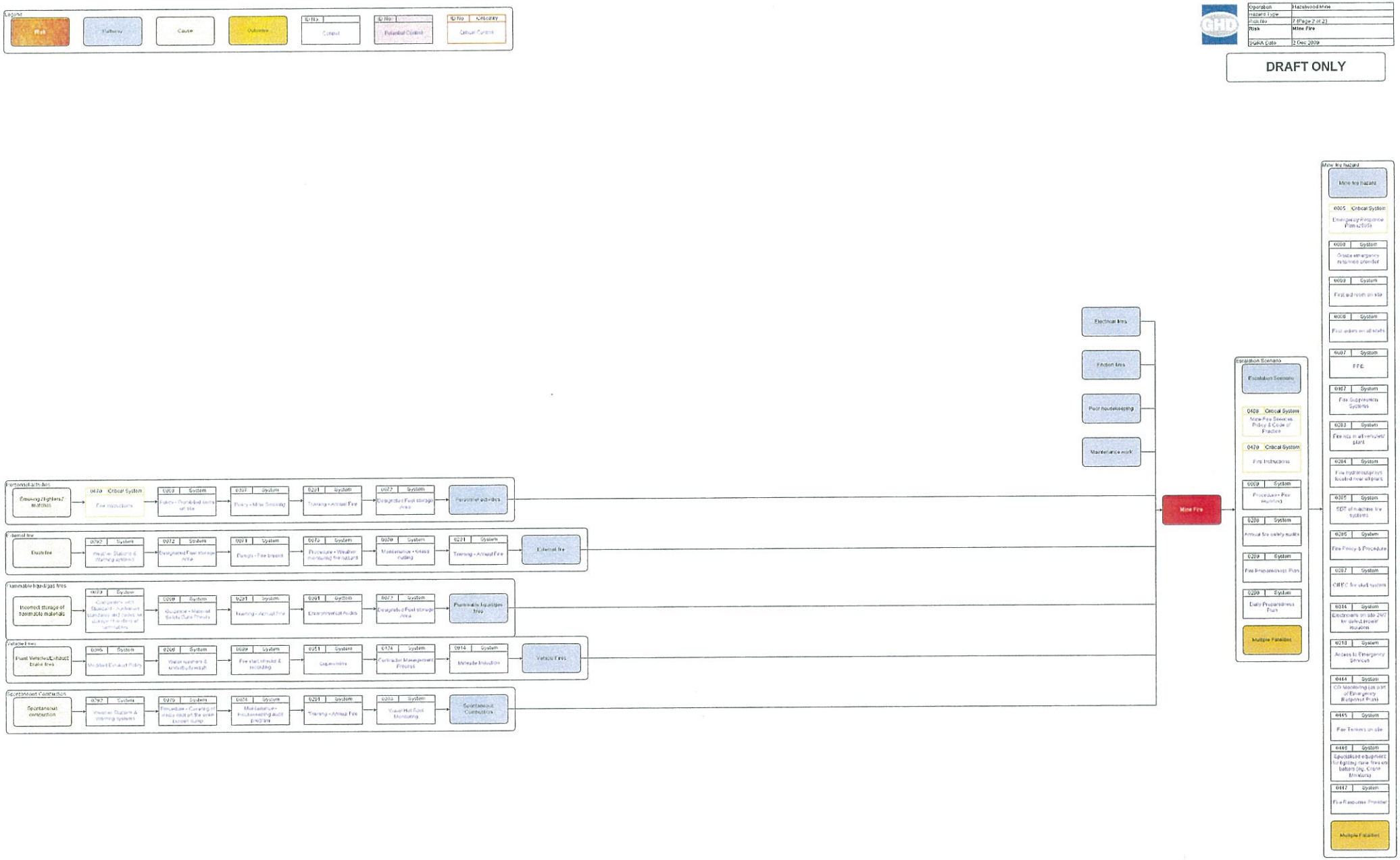
Operation	Hazelwood Mine
Hazard Type	
Risk No	7 (Page 1 of 2)
Risk	**Mine Fire**
SQRA Date	2 Dec 2009

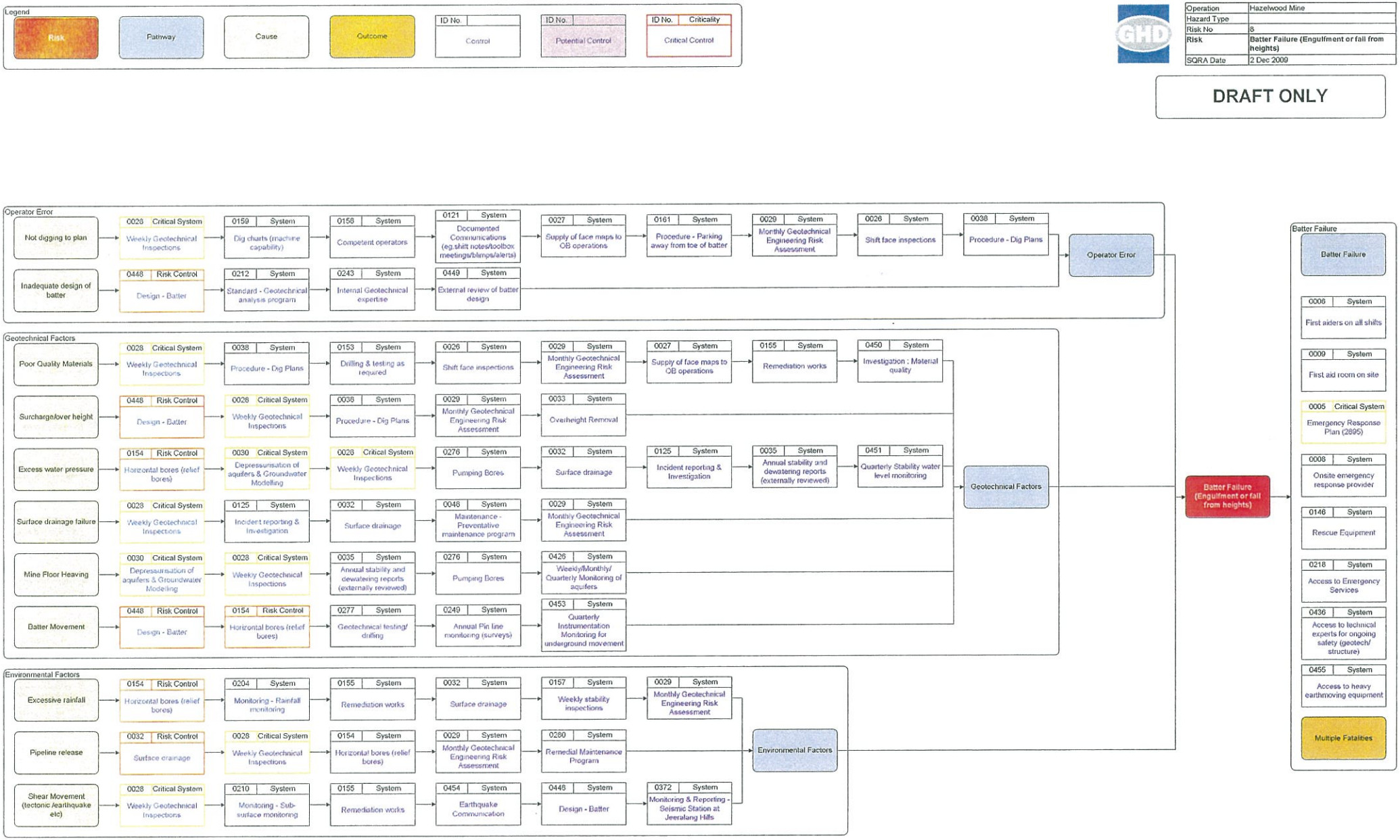
DRAFT ONLY

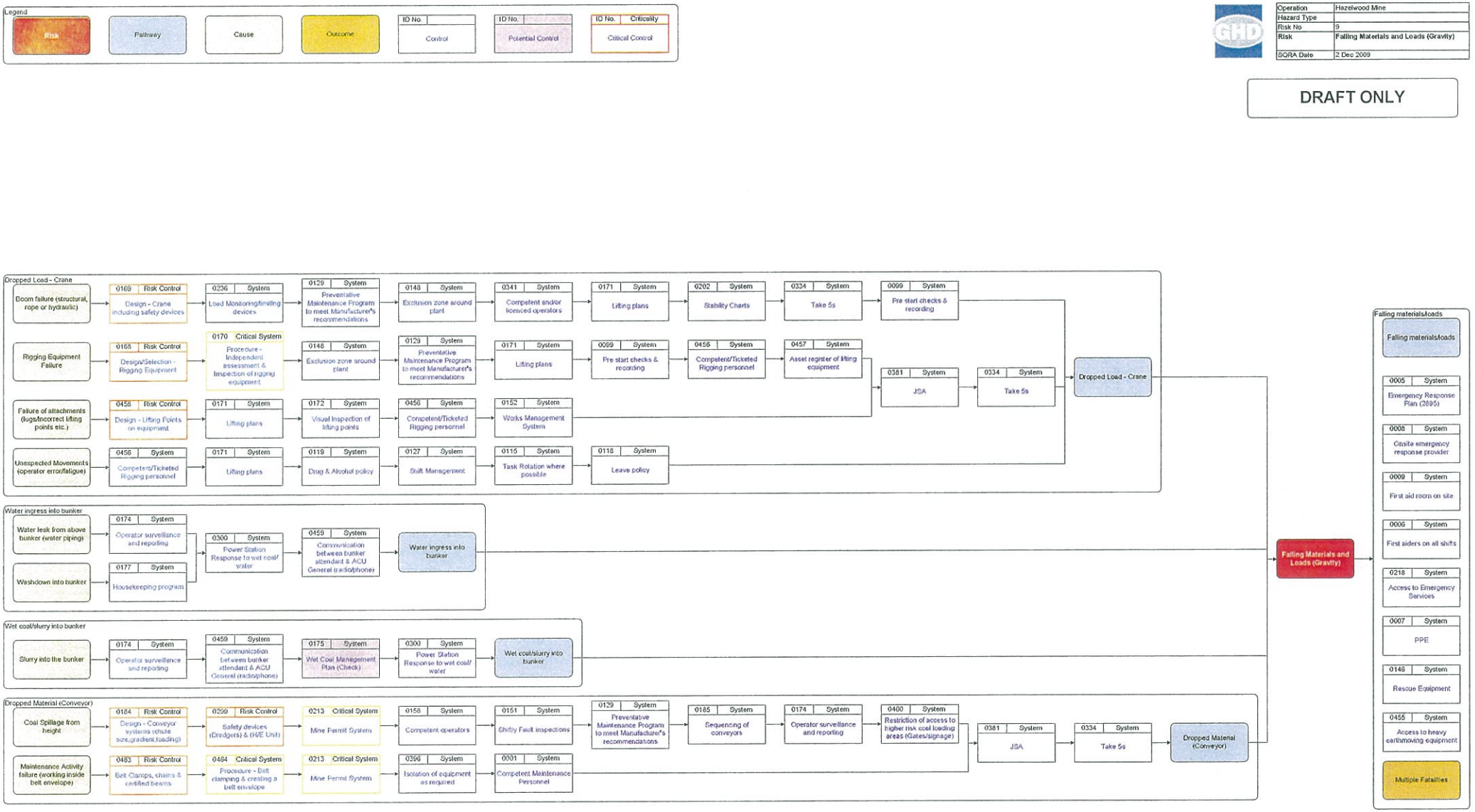


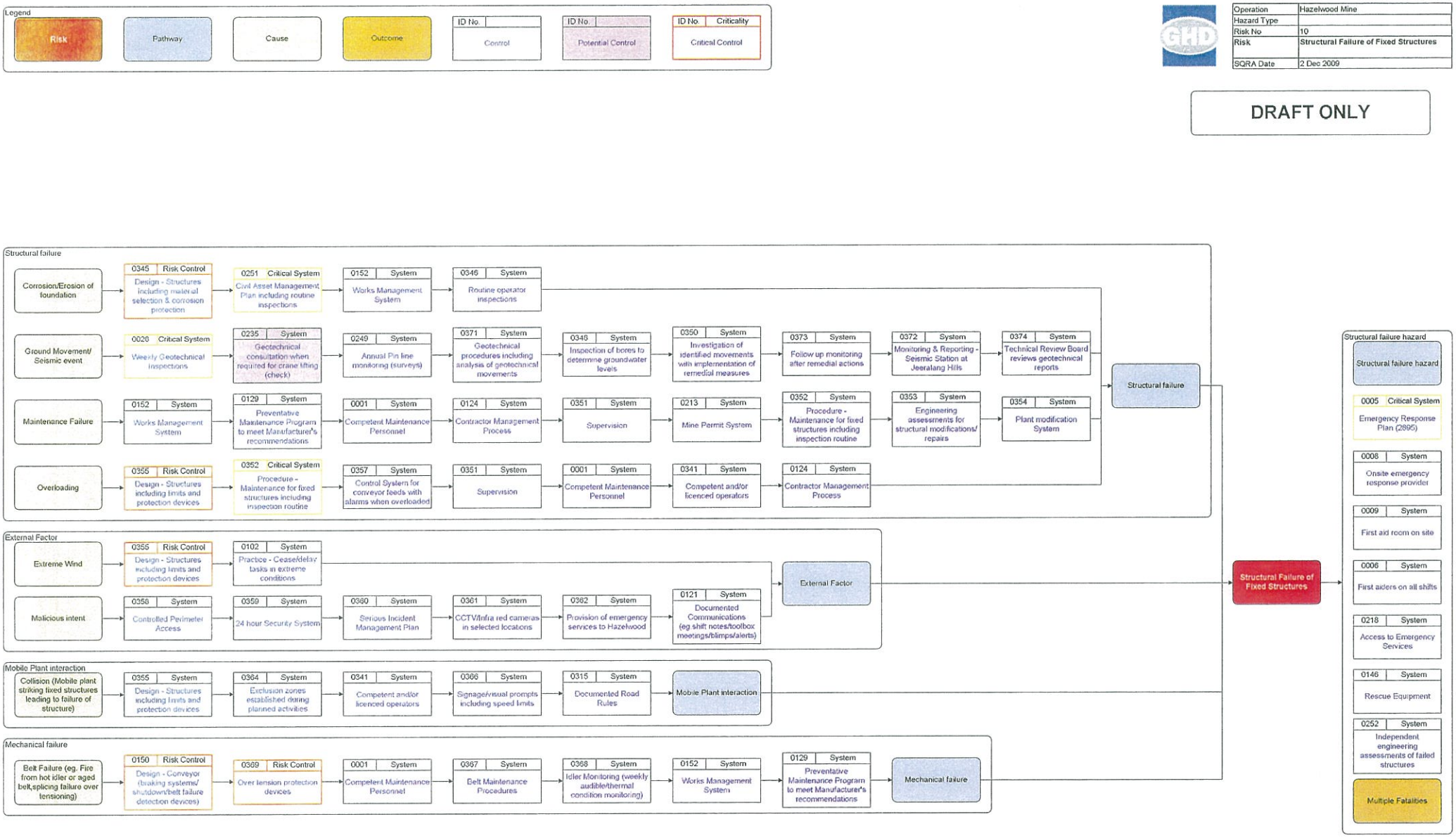


Electrical fires
Lightning
Electrical faults
Worn/ damaged equipment
Friction fires
Frictional heating e.g. conveyors
Plant brake overheating
Frictional heating e.g. tools/pumps/plant
Fuel housekeeping
Coal build up
Maintenance work
Hot works
Electrical fires
Friction fires
Fuel housekeeping
Maintenance work
Personnel activities
External fire
Flammable liquids/gas fires
Vehicle Fires
Spontaneous Combustion
Mine Fire
Escalation Scenario
0468 Critical System
Mine Fire Services Policy & Code of Practice
0470 Critical System
Fire instructions
0009 System
Procedure - Fire reporting
0208 System
Annual fire safety audits
0209 System
Fire Preparedness Plan
0290 System
Daily Preparedness Plan
Multiple Fatalities
Mine fire hazard
Mine fire hazard
0005 Critical System
Emergency Response Plan (2505)
0008 System
Onsite emergency response provider
0009 System
First aid room on site
0006 System
First aiders on all shifts
0007 System
PPE
0167 System
Fire Suppression Systems
0203 System
Fire kits on all vehicles/ plant
0204 System
Fire hydrants/sprays located near all plant
0205 System
SDT of machine fire systems
0206 System
Fire Policy & Procedure
0207 System
CITEC fire alert system
0314 System
Electricians on site 24/7 for defect repair/ isolation
0218 System
Access to Emergency Services
0444 System
CO Monitoring (as part of Emergency Response Plan)
0445 System
Fire Tankers on site
0446 System
Specialised equipment for fighting coal fires on batters (eg. Crane Monitors)
0447 System
Fire Response Provider
Multiple Fatalities


Legend
Risk
Pathway
Cause
Outcome
ID No
Control
ID No
Potential Control
ID No
Criticality
Critical Control
Operation
Hazelwood Mine
Hazard Type
Risk No
7 (Page 2 of 2)
Risk
Mine Fire
SigWA Date
2 Dec 2009
DRAFT ONLY
Electrical fires
Friction fires
Poor housekeeping
Maintenance work
Mine Fire
Escalation Scenario
Escalation Scenario
0408 Critical System
Mine Fire Services Policy & Code of Practice
0479 Critical System
Fire Instructions
0009 System
Procedure - Fire reporting
0208 System
Annual fire safety audits
0209 System
Fire Preparedness Plan
0299 System
Daily Preparedness Plan
Multiple Fatalities
Mine fire hazard
Mine fire hazard
0005 Critical System
Emergency Response Plan (ERP)
0006 System
Onsite emergency response personnel
0009 System
First aid room on site
0008 System
First aiders on all shifts
0007 System
PPE
0107 System
Fire Suppression systems
0283 System
Fire hits in all ventilated plant
0284 System
Fire hydrant/systems located near all plant
0285 System
SOP of machine fire systems
0286 System
Fire Policy & Procedure
0287 System
CMFC fire alert system
0314 System
Electricians on site 24/7 for safety/repair issues
0210 System
Access to Emergency Services
0444 System
CO Monitoring (as part of Emergency Response Plans)
0445 System
Fire Fighters on site
0446 System
Specialised equipment for fighting mine fires eg: battery pig, Crane fire works
0447 System
Fire Response Provider
Multiple Fatalities
Personnel activities
Smoking (lighters/ matches)
0479 Critical System
Fire Instructions
0209 System
Policy - Prohibited items on site
0207 System
Policy - Mine Smoking
0201 System
Training - Annual Fire
0072 System
Designated Fuel storage Area
Personnel activities
External fire
Flash fire
0792 System
Weather Stations & Warning systems
0072 System
Designated Fuel storage Area
0073 System
Policy - Fire Ireland
0076 System
Procedure - Weather monitoring fire hazard
0079 System
Maintenance - Grass cutting
0201 System
Training - Annual Fire
External fire
Flammable liquid/gas fires
Incorrect storage of flammable materials
0078 System
Compliance with Standards, Australian standards and Codes for storage of flammable materials
0209 System
Guidance - Material Safety Data Sheets
0201 System
Training - Annual Fire
0061 System
Environmental Audits
0072 System
Designated Fuel storage Area
Flammable liquid/gas fires
Vehicle Fires
Plant Vehicles/Exhaust/ Brake fires
0095 System
Modified Exhaust Policy
0206 System
Water hoppers & windbuffy setup
0029 System
Fire start-up kit & recording
0251 System
Supervisors
0124 System
Contractor Management Process
0014 System
Manuals Induction
Vehicle Fires
Spontaneous Combustion
Spontaneous combustion
0792 System
Weather Stations & Warning systems
0079 System
Procedure - Covering of mine dust on the main conveyor dump
0074 System
Maintenance - Housekeeping audit program
0201 System
Training - Annual Fire
0084 System
Water Hot Spot Monitoring
Spontaneous Combustion


Legend
Risk
Pathway
Cause
Outcome
ID No.
Control
ID No.
Potential Control
ID No. Criticality
Critical Control
Operation Hazelwood Mine
Hazard Type
Risk No 8
Risk Batter Failure (Engulfment or fall from heights)
SQRA Date 2 Dec 2009
DRAFT ONLY
Operator Error
Not digging to plan
0026 Critical System Weekly Geotechnical Inspections
0159 System Dig charts (machine capability)
0156 System Competent operators
0121 System Documented Communications (eg.shift notes/toolbox meetings/blimps/alerts)
0027 System Supply of face maps to OB operations
0161 System Procedure - Parking away from toe of batter
0029 System Monthly Geotechnical Engineering Risk Assessment
0026 System Shift face inspections
0038 System Procedure - Dig Plans
Inadequate design of batter
0448 Risk Control Design - Batter
0212 System Standard - Geotechnical analysis program
0243 System Internal Geotechnical expertise
0449 System External review of batter design
Operator Error
Geotechnical Factors
Poor Quality Materials
0028 Critical System Weekly Geotechnical Inspections
0038 System Procedure - Dig Plans
0153 System Drilling & testing as required
0026 System Shift face inspections
0029 System Monthly Geotechnical Engineering Risk Assessment
0027 System Supply of face maps to OB operations
0155 System Remediation works
0450 System Investigation : Material quality
Surcharge/over height
0448 Risk Control Design - Batter
0028 Critical System Weekly Geotechnical Inspections
0038 System Procedure - Dig Plans
0029 System Monthly Geotechnical Engineering Risk Assessment
0033 System Overheight Removal
Excess water pressure
0154 Risk Control Horizontal bores (relief bores)
0030 Critical System Depressurisation of aquifers & Groundwater Modelling
0028 Critical System Weekly Geotechnical Inspections
0276 System Pumping Bores
0032 System Surface drainage
0125 System Incident reporting & Investigation
0035 System Annual stability and dewatering reports (externally reviewed)
0451 System Quarterly Stability water level monitoring
Surface drainage failure
0028 Critical System Weekly Geotechnical Inspections
0125 System Incident reporting & Investigation
0032 System Surface drainage
0048 System Maintenance - Preventative maintenance program
0029 System Monthly Geotechnical Engineering Risk Assessment
Mine Floor Heaving
0030 Critical System Depressurisation of aquifers & Groundwater Modelling
0028 Critical System Weekly Geotechnical Inspections
0035 System Annual stability and dewatering reports (externally reviewed)
0276 System Pumping Bores
0426 System Weekly/Monthly/ Quarterly Monitoring of aquifers
Batter Movement
0448 Risk Control Design - Batter
0154 Risk Control Horizontal bores (relief bores)
0277 System Geotechnical testing/ drilling
0249 System Annual Pin line monitoring (surveys)
0453 System Quarterly Instrumentation Monitoring for underground movement
Geotechnical Factors
Environmental Factors
Excessive rainfall
0154 Risk Control Horizontal bores (relief bores)
0204 System Monitoring - Rainfall monitoring
0155 System Remediation works
0032 System Surface drainage
0157 System Weekly stability inspections
0029 System Monthly Geotechnical Engineering Risk Assessment
Pipeline release
0032 Risk Control Surface drainage
0028 Critical System Weekly Geotechnical Inspections
0154 System Horizontal bores (relief bores)
0029 System Monthly Geotechnical Engineering Risk Assessment
0280 System Remedial Maintenance Program
Shear Movement (tectonic /earthquake etc)
0028 Critical System Weekly Geotechnical Inspections
0210 System Monitoring - Sub-surface monitoring
0155 System Remediation works
0454 System Earthquake Communication
0448 System Design - Batter
0372 System Monitoring & Reporting - Seismic Station at Jeeralang Hills
Environmental Factors
Batter Failure (Engulfment or fall from heights)
Batter Failure
Batter Failure
0006 System First aiders on all shifts
0009 System First aid room on site
0005 Critical System Emergency Response Plan (2895)
0008 System Onsite emergency response provider
0146 System Rescue Equipment
0218 System Access to Emergency Services
0436 System Access to technical experts for ongoing safety (geotech/ structure)
0455 System Access to heavy earthmoving equipment
Multiple Fatalities


Legend
Risk
Pathway
Cause
Outcome
ID No. Control
ID No. Potential Control
ID No. Criticality Critical Control
Operation Hazelwood Mine
Hazard Type
Risk No 9
Risk Falling Materials and Loads (Gravity)
SQRA Date 2 Dec 2009
DRAFT ONLY
Dropped Load - Crane
Boom failure (structural, rope or hydraulic)
0169 Risk Control Design - Crane including safety devices
0236 System Load Monitoring/limiting devices
0129 System Preventative Maintenance Program to meet Manufacturer's recommendations
0148 System Exclusion zone around plant
0341 System Competent and/or licenced operators
0171 System Lifting plans
0202 System Stability Charts
0334 System Take 5s
0099 System Pre start checks & recording
Rigging Equipment Failure
0165 Risk Control Design/Selection - Rigging Equipment
0170 Critical System Procedure - Independent assessment & Inspection of rigging equipment
0146 System Exclusion zone around plant
0129 System Preventative Maintenance Program to meet Manufacturer's recommendations
0171 System Lifting plans
0099 System Pre start checks & recording
0456 System Competent/Ticketed Rigging personnel
0457 System Asset register of lifting equipment
0381 System JSA
0334 System Take 5s
Failure of attachments (lugs/incorrect lifting points etc.)
0458 Risk Control Design - Lifting Points on equipment
0171 System Lifting plans
0172 System Visual Inspection of lifting points
0456 System Competent/Ticketed Rigging personnel
0152 System Works Management System
Unexpected Movements (operator error/fatigue)
0456 System Competent/Ticketed Rigging personnel
0171 System Lifting plans
0119 System Drug & Alcohol policy
0127 System Shift Management
0115 System Task Rotation where possible
0118 System Leave policy
Dropped Load - Crane
Water ingress into bunker
Water leak from above bunker (water piping)
0174 System Operator surveillance and reporting
Washdown into bunker
0177 System Housekeeping program
0300 System Power Station Response to wet coal/ water
0459 System Communication between bunker attendant & ACU General (radio/phone)
Water ingress into bunker
Wet coal/slurry into bunker
Slurry into the bunker
0174 System Operator surveillance and reporting
0459 System Communication between bunker attendant & ACU General (radio/phone)
0175 System Wet Coal Management Plan (Check)
0300 System Power Station Response to wet coal/ water
Wet coal/slurry into bunker
Dropped Material (Conveyor)
Coal Spillage from height
0184 Risk Control Design - Conveyor systems (chute size,gradient,loading)
0200 Risk Control Safety devices (Dredgers) & (H/E Unit)
0213 Critical System Mine Permit System
0158 System Competent operators
0151 System Shifty Fault inspections
0129 System Preventative Maintenance Program to meet Manufacturer's recommendations
0185 System Sequencing of conveyors
0174 System Operator surveillance and reporting
0400 System Restriction of access to higher risk coal loading areas (Gates/signage)
Maintenance Activity failure (working inside belt envelope)
0483 Risk Control Belt Clamps, chains & certified beams
0484 Critical System Procedure - Belt clamping & creating a belt envelope
0213 Critical System Mine Permit System
0396 System Isolation of equipment as required
0001 System Competent Maintenance Personnel
0381 System JSA
0334 System Take 5s
Dropped Material (Conveyor)
Falling Materials and Loads (Gravity)
Falling materials/loads
Falling materials/loads
0005 System Emergency Response Plan (2695)
0008 System Onsite emergency response provider
0009 System First aid room on site
0006 System First aiders on all shifts
0218 System Access to Emergency Services
0007 System PPE
0148 System Rescue Equipment
0455 System Access to heavy earthmoving equipment
Multiple Fatalities


Legend
Risk
Pathway
Cause
Outcome
ID No.
Control
ID No.
Potential Control
ID No. Criticality
Critical Control
Operation Hazelwood Mine
Hazard Type
Risk No 10
Risk Structural Failure of Fixed Structures
SQRA Date 2 Dec 2009
DRAFT ONLY
Structural failure
Corrosion/Erosion of foundation
0345 Risk Control
Design - Structures including material selection & corrosion protection
0251 Critical System
Civil Asset Management Plan including routine inspections
0152 System
Works Management System
0346 System
Routine operator inspections
Ground Movement/ Seismic event
0026 Critical System
Weekly Geotechnical Inspections
0235 System
Geotechnical consultation when required for crane lifting (check)
0249 System
Annual Pin line monitoring (surveys)
0371 System
Geotechnical procedures including analysis of geotechnical movements
0348 System
Inspection of bores to determine groundwater levels
0350 System
Investigation of identified movements with implementation of remedial measures
0373 System
Follow up monitoring after remedial actions
0372 System
Monitoring & Reporting - Seismic Station at Jeeralang Hills
0374 System
Technical Review Board reviews geotechnical reports
Maintenance Failure
0152 System
Works Management System
0129 System
Preventative Maintenance Program to meet Manufacturer's recommendations
0001 System
Competent Maintenance Personnel
0124 System
Contractor Management Process
0351 System
Supervision
0213 System
Mine Permit System
0352 System
Procedure - Maintenance for fixed structures including inspection routine
0353 System
Engineering assessments for structural modifications/ repairs
0354 System
Plant modification System
Overloading
0356 Risk Control
Design - Structures including limits and protection devices
0352 Critical System
Procedure - Maintenance for fixed structures including inspection routine
0357 System
Control System for conveyor feeds with alarms when overloaded
0351 System
Supervision
0001 System
Competent Maintenance Personnel
0341 System
Competent and/or licenced operators
0124 System
Contractor Management Process
Structural failure
External Factor
Extreme Wind
0355 Risk Control
Design - Structures including limits and protection devices
0102 System
Practice - Cease/delay tasks in extreme conditions
Malicious intent
0358 System
Controlled Perimeter Access
0359 System
24 hour Security System
0360 System
Serious Incident Management Plan
0361 System
CCTV/infra red cameras in selected locations
0362 System
Provision of emergency services to Hazelwood
0121 System
Documented Communications (eg shift notes/toolbox meetings/blimps/alerts)
External Factor
Mobile Plant interaction
Collision (Mobile plant striking fixed structures leading to failure of structure)
0355 System
Design - Structures including limits and protection devices
0364 System
Exclusion zones established during planned activities
0341 System
Competent and/or licenced operators
0366 System
Signage/visual prompts including speed limits
0315 System
Documented Road Rules
Mobile Plant interaction
Mechanical failure
Belt Failure (eg. Fire from hot idler or aged belt,splicing failure over tensioning)
0150 Risk Control
Design - Conveyor (braking systems/ shutdown/belt failure detection devices)
0369 Risk Control
Over tension protection devices
0001 System
Competent Maintenance Personnel
0367 System
Belt Maintenance Procedures
0368 System
Idler Monitoring (weekly audible/thermal condition monitoring)
0152 System
Works Management System
0129 System
Preventative Maintenance Program to meet Manufacturer's recommendations
Mechanical failure
Structural Failure of Fixed Structures
Structural failure hazard
Structural failure hazard
0005 Critical System
Emergency Response Plan (2695)
0008 System
Onsite emergency response provider
0009 System
First aid room on site
0006 System
First aiders on all shifts
0218 System
Access to Emergency Services
0146 System
Rescue Equipment
0252 System
Independent engineering assessments of failed structures
Multiple Fatalities

Appendix B

Controls List

ID	Control Name	Criticality
0001	Competent Maintenance Personnel	System
0003	Explosion vents	System
0005	Emergency Response Plan (2895)	Critical System
0006	First aiders on all shifts	System
0007	PPE	System
0008	Onsite emergency response provider	System
0009	First aid room on site	System
0011	HV Routine Maintenance program	Critical System
0012	Design - HV Switching Equipment	Risk Control
0014	Minesite Induction	System
0016	Design & Layout - Cables	Risk Control
0019	Electrical drawings (Mine drawing system & 2 controlled hard copies)	System
0020	HV Operator	System
0021	Restricted access to authorised personnel (locks & signs)	Critical System
0024	Digging Procedures	System
0025	Coal joint Monitoring & remediation procedures	System
0026	Shift face inspections	System
0027	Supply of face maps to OB operations	System
0028	Weekly Geotechnical Inspections	Critical System
0029	Monthly Geotechnical Engineering Risk Assessment	System
0030	Depressurisation of aquifers & Groundwater Modelling	Critical System
0032	Surface drainage	Risk Control
0033	Overheight Removal	System
0035	Annual stability and dewatering reports (externally reviewed)	System
0036	Competent Trained operators	System
0038	Procedure - Dig Plans	System
0039	Procedure - Dredger/Stacker operations	System
0040	Inspection - Weekly Mine inspections	System
0042	Inspection - Daily inspection (Engineers/Planners)	System
0044	Dump design (height)	Risk Control
0045	Dozer maintenance of dump grades	System
0048	Maintenance - Preventative maintenance program	System
0049	Equipment - Control devices (limit switches/sensors etc)	System
0052	Standard - Works Management System	System
0057	Standard - Site design standard for plant	System

ID	Control Name	Criticality
0058	Standard - Site engineering standard for introduction or removal of plant	System
0060	Procedure - Defect reporting	System
0061	Inspection - Safety Walks	System
0062	Maintenance - Daily cleaning or on request (hose down / shovel clean)	Critical System
0063	Design - Design to prevent spillage	System
0064	Procedure - Permit System (Hot work)	Critical System
0065	Inspection - Follow-up inspections	System
0066	Procedure - Fireman / spotter for hotwork	System
0068	Policy - Prohibited items on site	System
0069	Procedure - Fire reporting	System
0070	Maintenance - Grass cutting	System
0071	Design - Fire breaks	System
0072	Designated Fuel storage Area	System
0073	Procedure - Weather monitoring fire hazard	System
0074	Maintenance - Housekeeping audit program	System
0075	Procedure - Covering of waste coal on the over-burden dump	System
0079	Compliance with Standard - Australian standards and codes for storage / handling of flammables	System
0080	Guideline - Material Safety Data Sheets	System
0082	Design - Earthing systems	System
0086	Design - IP rated electrical equipment	System
0087	Standard - Australian standards/regulations and codes for electrical installations (AS 3000)	System
0088	Standard - Site standard for cable management	System
0089	Standard - Site design standard for electrical equipment	System
0090	Procedure - Mine Registered & Confined Space including Confined Space Register/Permit System (3090)	Critical System
0094	Ventilation	System
0095	Signage/Labelling of confined space	System
0096	Standby person - Confined Space	System
0097	Minimum Equipment standards - Compliant Mobile plant to standards (check standards)	System
0098	Dust suppression of access surfaces	System
0099	Pre start checks & recording	System
0100	Shift changeover meeting	System
0102	Practice - Cease/delay tasks in extreme conditions	System
0103	Flashing lights when appropriate	System
0106	Windshield wipers/washers	System
0110	Road Maintenance Program including regular grading & road surfacing material	System
0111	Seat belts where fitted	System

ID	Control Name	Criticality
0113	ROPs on Mining plant where fitted	Risk Control
0114	Airbags on select LVs	System
0115	Task Rotation where possible	System
0116	Employee Assistance Program available	System
0118	Leave policy	System
0119	Drug & Alcohol policy	System
0121	Documented Communications (eg.shift notes/toolbox meetings/blimps/alerts)	System
0123	Disciplinary Policy	System
0124	Contractor Management Process	System
0125	Incident reporting & Investigation	System
0127	Shift Management	System
0129	Preventative Maintenance Program to meet manufacturer's specifications	Critical System
0131	Biennial External structural inspections	System
0132	Procedure - Lubrication	System
0133	Painting programs	System
0137	Engineer approved Procedures - Jacking	Critical System
0138	Jack design & failsafe devices (eg.Pilot operated check valves)	Risk Control
0139	Asset register of jacking equipment	System
0141	Confined Space Risk assessment	System
0143	Initial Gas Testing	System
0145	Design - Raw Coal Bunker (eg. personnel guarding)	Risk Control
0146	Rescue Equipment	System
0148	Exclusion zone around plant	Risk Control
0150	Design - Conveyor (braking systems/shutdown/belt failure detection devices)	Risk Control
0151	Shiftly Fault inspections	Critical System
0152	Works Management System	System
0153	Drilling & testing as required	System
0154	Horizontal bores (relief bores)	Risk Control
0155	Remediation works	System
0157	Weekly stability inspections	System
0158	Competent operators	System
0159	Dig charts (machine capability)	System
0161	Procedure - Parking away from toe of batter	System
0163	Washing of sealed roads to remove clay/debris	System
0164	Design - Roadways	Risk Control
0165	Design - Light Vehicles (fit for purpose)	Risk Control
0166	Signage (Speed limits etc)	System

ID	Control Name	Criticality
0167	Fire Suppression Systems	System
0168	Design/Selection - Rigging Equipment	Risk Control
0169	Design - Crane including safety devices	Risk Control
0170	Procedure - Independent assessment & Inspection of rigging equipment	Critical System
0171	Lifting plans	System
0172	Visual inspection of lifting points	System
0174	Operator surveillance and reporting	System
0175	Wet Coal Management Plan (Check)	System
0177	Housekeeping program	System
0178	Maintenance program	System
0184	Design - Conveyor systems (chute size, gradient, loading)	Risk Control
0185	Sequencing of conveyors	System
0187	Limits of approach to be maintained around HV Plant	Critical System
0189	Safety Observer where appropriate	System
0191	Marking/Signs located at plant below overhead lines	System
0192	Flashing lights on crane	System
0200	Crane outriggers/bog mats/packing blocks	System
0201	Site preparations (compacting/levelling/filling)	System
0202	Stability Charts	System
0203	Crane Outriggers extended where needed	System
0204	Monitoring - Rainfall monitoring	System
0210	Monitoring - Sub-surface monitoring	System
0212	Standard - Geotechnical analysis program	System
0213	Mine Permit System	Critical System
0214	Take 5s (JSA)	System
0215	Authorised Issuing officers to issue confined space permit	System
0216	External Confined Space Training for Authorised issuing officers	System
0217	Confined space training covering confined space hazards (internal)	System
0218	Access to Emergency Services	System
0219	Mine Rescue Team	System
0220	Rescue Plan required as part of Confined Space Permit	System
0221	GPS Anti-collision warning systems	System
0223	Mine Design - Grading Plan	System
0224	Dividing strip on major Haul roads	System
0225	Shift Rostering	System
0226	Competent Personnel operating plant	System
0228	Pre-start meeting	System

ID	Control Name	Criticality
0229	Mobile Equipment - Fit for purpose (Cab layout & design, Failsafe controls)	Risk Control
0232	Safety device testing program	System
0233	ISI - Independent Structural inspection program	System
0235	Geotechnical consultation when required for crane lifting (check)	System
0236	Load Monitoring/limiting devices	Risk Control
0237	Fall protection on EWPs	System
0238	External testing of jacking equipment	Critical System
0241	OEM Maintenance procedures to specify jacking points	System
0243	Internal Geotechnical expertise	System
0244	Training - Machine Stability & Heavy Jacking (Specific to site, provided by engineer)	System
0245	Controlled specialist equipment used where required	System
0247	Check procedure for - Engineer on site during critical jacking steps (where required)	System
0248	Established Geotechnical standards (Australian Standards)	System
0249	Annual Pin line monitoring (surveys)	System
0251	Civil Asset Management Plan including routine inspections	Critical System
0252	Independent engineering assessments of failed structures	System
0255	Annual Groundwater & Geotechnical reports	System
0257	Safety limits on Machinery	Risk Control
0258	Routine Machine safety device testing	System
0262	Shiftly Machine inspections by operators	System
0267	HV Routine Maintenance / Testing	System
0268	Vicinity Access Permits	System
0269	Procedure - Cable Handling	System
0270	Electrical Protection Systems	Risk Control
0273	Procedure - Electrically isolating plant	System
0274	Remote Isolation	System
0276	Pumping Bores	System
0277	Geotechnical testing/drilling	System
0280	Remedial Maintenance Program	System
0283	Fire kits in all vehicles/plant	System
0284	Fire hydrants/sprays located near all plant	System
0285	SDT of machine fire systems	System
0286	Fire Policy & Procedure	System
0287	CITEC fire alert system	System
0288	Annual fire safety audits	System
0289	Fire Preparedness Plan	System
0290	Daily Preparedness Plan	System

ID	Control Name	Criticality
0291	Training - Annual Fire	System
0292	Weather Stations & Warning systems	System
0293	Equipment Protection Devices	Risk Control
0294	Fire suppression in cubicles	System
0299	Safety devices (Dredgers) & (H/E Unit)	Risk Control
0300	Power Station Response to wet coal/water	System
0301	Environmental Audits	System
0302	Thermal Imaging	System
0303	Visual Hot Spot Monitoring	System
0305	Modified Exhaust Policy	System
0306	Water washers & underbody wash	System
0307	Policy - Mine Smoking	System
0308	Procedure - Bunker Wash	System
0309	Temperature Monitoring/Trips of critical components	System
0312	Overhead Earthing Conductors on above ground 6.6kV feeders	System
0313	Surge Diverters / Lightning arrestors on plant	System
0314	Electricians on site 24/7 for defect repair/isolation	System
0315	Documented Road Rules	System
0316	PPE & Specialised harnesses/Restraints	System
0318	Physical Isolation of tanks eg. Handrails/guarding, Lockable valves	Risk Control
0319	Design - Covers/Isolation preventing confined space entry	System
0320	Low emission products in registered spaces where possible (substitution)	System
0321	Gas Detectors for ongoing monitoring	System
0322	PPE including continuous air supply or air filtration system	System
0324	PPE (sunglasses)	System
0325	Exclusion of light vehicles from major haul roads	System
0326	Major haul roads conforming with standards	Risk Control
0328	Procedure - (SWI) Safety inspection of mine roads	System
0329	Documented Operating rules for heavy vehicles (confirm)	System
0330	Fault reporting & recording system	System
0331	Plant pre-start checks	System
0333	Ticketed operators	System
0334	Take 5s	System
0336	Vehicle Washing	System
0337	Pre start checks & recording of vehicle conditions (logbooks)	System
0340	Design - Fit for purpose vehicle (light vehicle/forklifts/scissor lifts/bobcats/firetrucks/trailers)	Risk Control
0341	Competent and/or licenced operators	System

ID	Control Name	Criticality
0342	Fatigue Management Policy	System
0343	Heat stress Policy	System
0345	Design - Structures including material selection & corrosion protection	Risk Control
0346	Routine operator inspections	System
0348	Inspection of bores to determine groundwater levels	System
0350	Investigation of identified movements with implementation of remedial measures	System
0351	Supervision	System
0352	Procedure - Maintenance for fixed structures including inspection routine	Critical System
0353	Engineering assessments for structural modifications/repairs	System
0354	Plant modification System	System
0355	Design - Structures including limits and protection devices	Risk Control
0357	Control System for conveyor feeds with alarms when overloaded	System
0358	Controlled Perimeter Access	System
0359	24 hour Security System	System
0360	Serious Incident Management Plan	System
0361	CCTV/Infra red cameras in selected locations	System
0362	Provision of emergency services to Hazelwood	System
0363	Communications	System
0364	Exclusion zones established during planned activities	System
0366	Signage/visual prompts including speed limits	System
0367	Belt Maintenance Procedures	System
0368	Idler Monitoring (weekly audible/thermal condition monitoring)	System
0369	Over tension protection devices	Risk Control
0371	Geotechnical procedures including analysis of geotechnical movements	System
0372	Monitoring & Reporting - Seismic Station at Jeeralang Hills	System
0373	Follow up monitoring after remedial actions	System
0374	Technical Review Board reviews geotechnical reports	System
0375	Authorised HV operator to issue HV Permits (as part of Mine Permit System)	System
0376	HV Electrical protection systems (Sensitive earth leakage protection/IT earthing system)	Risk Control
0377	Routine inspection of HV protection systems	System
0378	HV Operator present when High mobile plant travels under overhead lines	System
0379	SP Ausnet Permit System	System
0380	SP Ausnet HV permit issuers	System
0381	JSA	System
0382	Mine feeder systems protected by SP Ausnet Protection systems set to mine standards	System
0383	SP Ausnet protection systems (set to SP Ausnet requirements)	System
0384	Routine inspections of poles	System

ID	Control Name	Criticality
0386	Procedure - Isolation/Earthing	Critical System
0387	Competent personnel (linesman)	System
0388	Isolation & Earths	Risk Control
0389	No live line work done within mines	System
0390	Safety observer	System
0391	Procedure - HV Switching	Critical System
0392	Independent HV operator assesses HV Switching task (part of Permit)	System
0393	Testing - In accordance with Installation Regulations under Safety Act	System
0394	Blue Book (Code of practice - HV Electricity)	System
0395	Licensed Electricians	System
0396	Isolation of equipment as required	System
0397	Minor LV Permit system (contractors)	System
0398	Limited access to live equipment inside cubicles	System
0399	Labelling on plant inside cubicles	System
0400	PPE (Gloves/face shields)	System
0401	Defibrillator	System
0403	Operational Cleaning	System
0404	Inspection - Shiftly Mine Inspections (operators)	System
0405	Procedure - Batter Slope for Coal	System
0406	Procedure - Batter Slope for Overburden	System
0407	Competent Mine Planners/Engineers/Surveyors	System
0408	Safety margins within limits of operation (Machine & Design plan)	System
0409	Engineering support on call	System
0410	Communications - 2 way radio	System
0411	Communications protocols between mobile plant and major mining plant	System
0412	Design - Dredger/Stacker eg. Safety hooks	Risk Control
0414	Register of machine balance to monitor machine stability	System
0415	Condition Monitoring Program	System
0416	Engineering review of Maintenance Activities	System
0417	External technical review on complex activities	System
0418	Competent Maintenance Personnel with mine specific training	System
0419	Procedure - Geotechnical ground preparation	System
0420	Preventative maintenance program for maintenance equipment	System
0421	Maintenance Procedures	System
0422	Procedure - Heavy Jack Testing	System
0423	Procedure - Lifting tackle Testing	System
0424	Inspection - Maintenance Trestles	System

ID	Control Name	Criticality
0425	5 Yearly Coal joint mapping Report	System
0426	Weekly/Monthly/Quarterly Monitoring of aquifers	System
0427	Annual Geotechnical Report	System
0428	Procedure - Digging (Overburden)	System
0429	Placement of material	System
0430	Operator monitoring of formation	System
0431	Procedure - Formation of dumps	System
0432	Deliberate cancellation of device to facilitate operating (CSD)	System
0433	Procedure - Safety Device Testing	System
0434	Competent/Trained/Authorised Testers	System
0436	Access to technical experts for ongoing safety (geotech/structure)	System
0437	Heavy jacks maintained offsite	System
0438	Certification of load testing (jacks)	System
0439	Heavy jacks are tested before use	System
0441	Wind Speed Monitoring from control centre	System
0442	Anemometers taken on site	System
0443	Access to heavy lifting equipment	System
0444	CO Monitoring (as part of Emergency Response Plan)	System
0445	Fire Tankers on site	System
0446	Specialised equipment for fighting mine fires on batters (eg. Crane Monitors)	System
0447	Fire Response Provider	System
0448	Design - Batter	Risk Control
0449	External review of batter design	System
0450	Investigation: Material quality	System
0451	Quarterly Stability water level monitoring	System
0453	Quarterly Instrumentation Monitoring for underground movement	System
0454	Earthquake Communication	System
0455	Access to heavy earthmoving equipment	System
0456	Competent/Ticketed Rigging personnel	System
0457	Asset register of lifting equipment	System
0458	Design - Lifting Points on equipment	Risk Control
0459	Communication between bunker attendant & ACU General (radio/phone)	System
0460	Restriction of access to higher risk coal loading areas (Gates/signage)	System
0463	Belt Clamps, chains & certified beams	Risk Control
0464	Procedure - Belt clamping & creating a belt envelope	Critical System
0465	Maximum Speed Limits	System
0468	Mine Fire Services Policy & Code of Practice	Critical System

ID	Control Name	Criticality
0469	Monitoring: On-line bore output	Critical System
0470	Fire Instructions	Critical System

Appendix C

Sample Performance Standards

Risk Control # 00	**Critical Control description:** Design - Conveyor systems (chute size, gradient, loading)	
MMH Group	Falling Materials and Loads (Gravity)	SMS Ref No. -

Dependability assessment:	**Practicality** assessment:
• Reduces spill from conveyors • This has been designed into new plant • Equipment is designed by external engineers to applicable standard and design criteria / specification • Designed to be compatible with material being handled	• New conveyor design relates to westfield area. • Older plant is to be retired in 2 years, continuing active maintenance and monitoring will be conducted in the interim • Not possible to retrofit many new design features to old equipment / conveyors (soft loading chutes have been retrofitted, but some others could not be)

Monitoring assessment:	**Workforce involvement** assessment:
• None	• Equipment is measured against design criteria / specification (and suitability / effectiveness evaluated)

Related **actions** & **owners**:	**Notes**:
Performance Standards: • Conveyor systems design meet Australian Standards (minimum requirement) • Coal is contained by conveyor systems • Load limits on conveyors are defined • Conveyor systems have overload detection and warning • Conveyor systems fail safe on blockage or flow restriction	**Effectiveness Measures:** • 100% compliance of design • Inspection, reporting and investigation routine for coal spills • Coal load limits not exceeded • Overload detection and warning devices tested periodically and found to be fully functional • Fail safe controls tested periodically and found to be fully functional

Critical System Control # 00	**Critical Control description:** Confined Space Procedure	
MMH Group	Confined Spaces	SMS Ref No. -

Dependability assessment:	**Practicality** assessment:
• Confined space procedures are also applied to registered spaces at the discretion of personnel entering space • People in mine are not well trained in confined space entry procedures, as it is an abnormal job (i.e. limited confined spaces in the mine) • Chemists from the power station are used for testing of air quality in confined spaces	• Mine maintenance personnel are required to enter confined spaces as they have to do the work, but it is considered practical to use chemists to test the atmosphere and recommend measures to make it acceptable to work in • Use of standard procedures is deemed practical • Industry standard confined space entry procedures are used
Monitoring assessment:	**Workforce involvement** assessment:
• Chemists are used for air quality monitoring • A Spotter is required for all confined space entries	• Confined space entry procedure is common across entire business • Limited training in confined spaces for mine maintenance personnel
Related **actions** & **owners**:	**Notes**:

Performance Standards:	Effectiveness Measures:
• Confined Spaces are identified and registered • Confined Space Risk Assessments are documented for all confined spaces • A confined Space Entry Permit is issued for each confined space entry • An Authorised person issues Confined Space Entry Permits • Gas testing is undertaken on confined spaces prior to entry	• Register of Confined spaces • Register of Confined Space Risk assessments • 100% compliance with confined space entry permits • 100% of confined space entry permits are issued by authorised persons • Records of gas testing results are retained

GHD

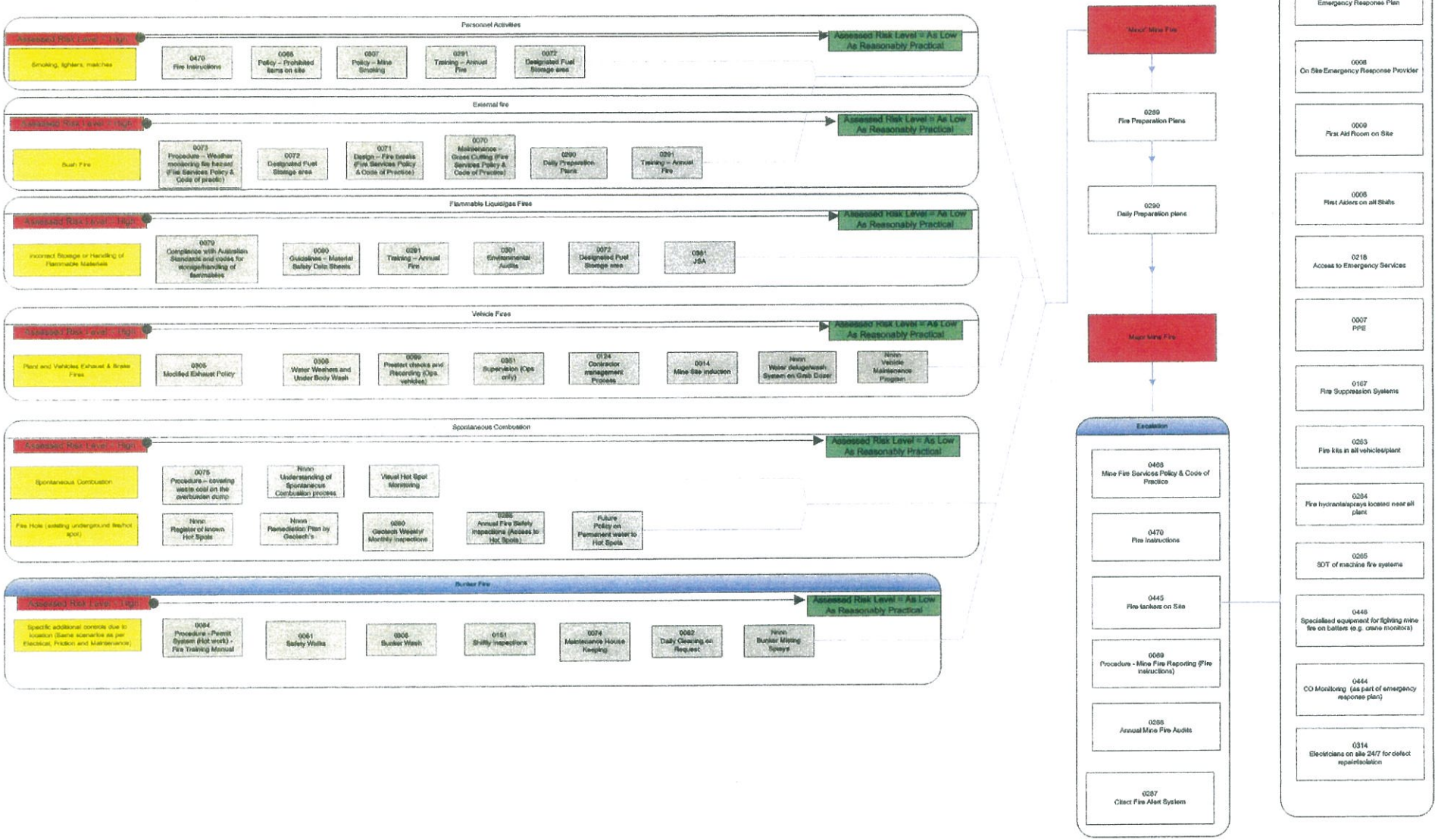
180 Lonsdale Street
Melbourne, Victoria 3000
T: (03) 8687 8000 F: (03) 8687 8111 E: melmail@ghd.com.au

Document Status

Rev No.	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
A	V.Khera	R.Mills	R.C.Mills		R.C.Mills	24/12/09

Monday, October 22, 2012

IPR-GDF Suez Major Mining Hazard 7 – Mine Fire (Major Fire) Page 2 of 2



Reviewed June 2012

System Control #	System Control description – Visual Hot Spot Monitoring		
MMH Group	**MMH Group- Mine Fire (MMH No 7)** Scenario - Spontaneous Combustion	**Control Type :** System Control	SMS Location SMS Ref No. Responsible Officer :
Function/Objective – There are several known "hot spots" on various coal faces in the mine. These have been repaired/ remediated but they still require ongoing inspection/ monitoring on a regular basis due to possible spontaneous combustion eruptions			
Ref: k:\major mining hazards\mmh review 2009\20100706 current bowties perf measures and control locations\current performance standards\revised performance measure (master).doc			

Related **actions** & **owners**:	**Notes**:			
	Effectiveness Measures:			
Performance Elements:	**What to measure**	**Method of measuring**	**By who (role)**	**Frequency of monitoring**
Monitoring of "Hot Spots"	Check of known hot spot areas	Visual (smoke haze) Smell (carbon)	Fire Services	Tri weekly
Monitoring of coal faces and Hot Spots	Check of coal faces and hot spot areas	Visual (smoke haze)	Shift Ops 2 x12	Shiftly
Related Controls –				