The Southland Colliery Fire December 2003

Peter J Hayes
PJH Consulting

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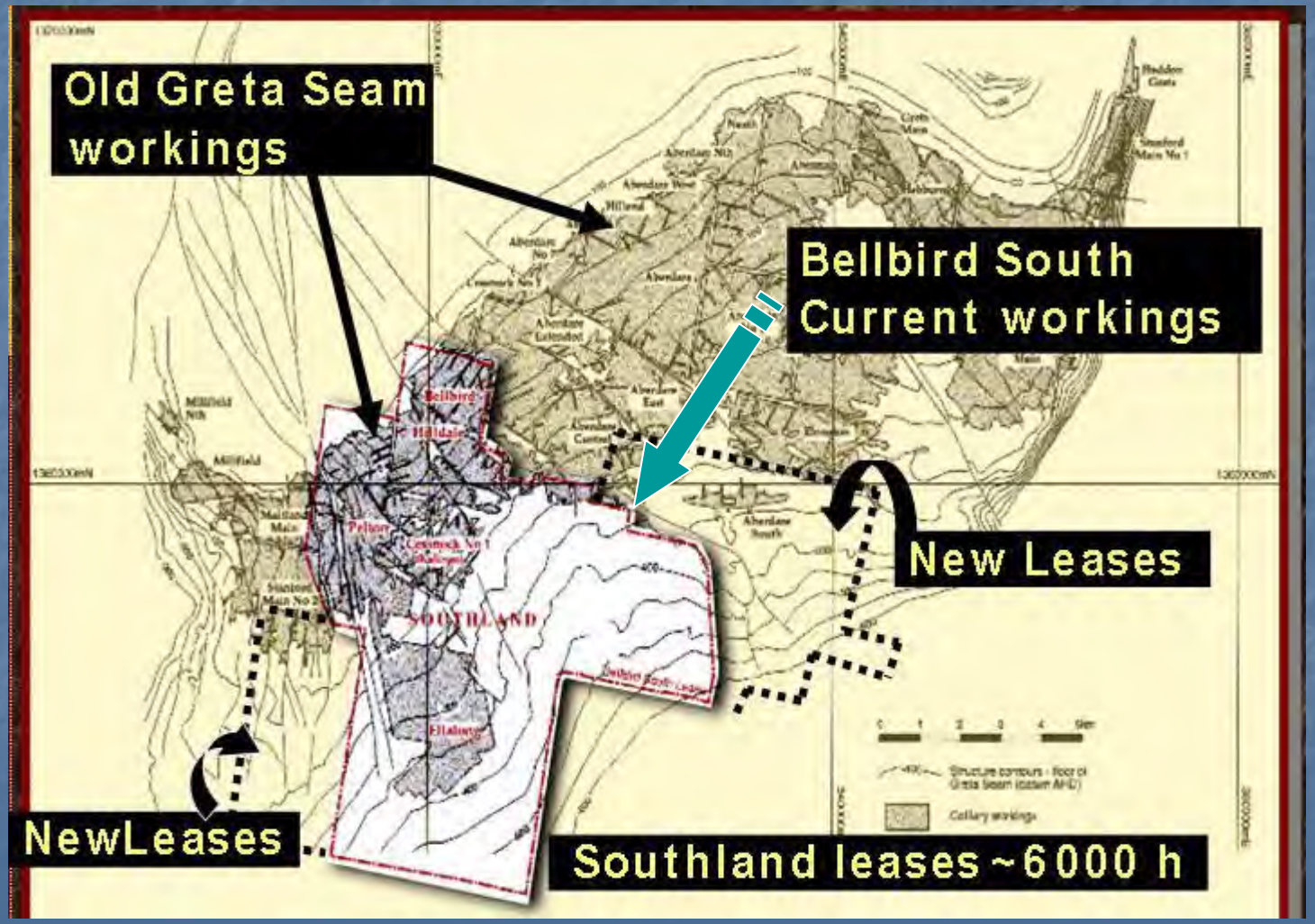
Contents

- The mine location,seam,plan
- The incident
- Re-Entry to the mine
- The Damage Found
- Where did the fire start?
- How intense was it?
- The Future

Mine Location

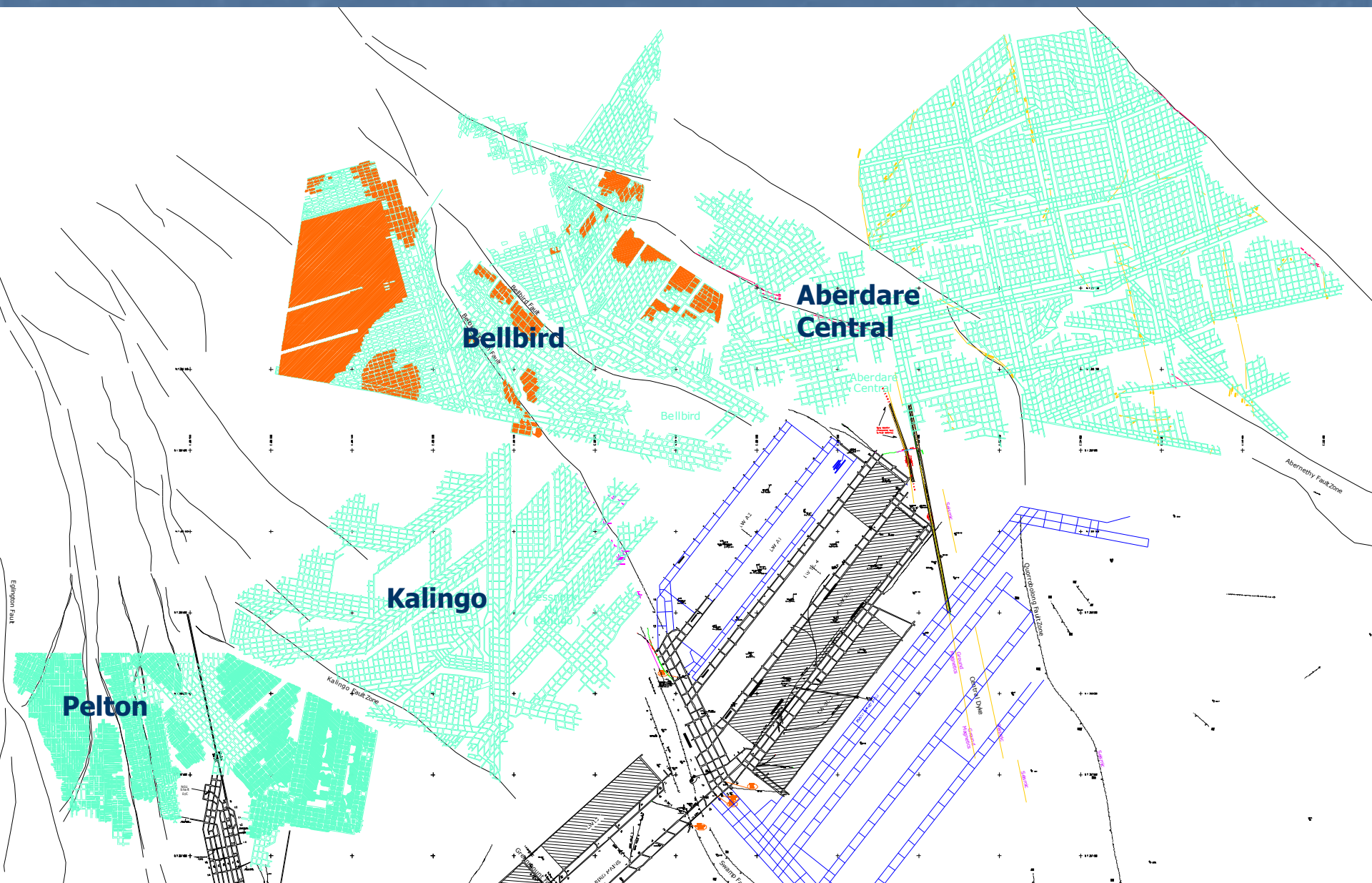
Greta Seam Coal Leases



Greta Seam at Southland

- **450-650m depth of cover**
- **6-7m thick, dip 1:20**
- **40% Volatiles**
- **Semi-hard Coking Coal**
- **4-5% raw ash**
- **>20,000 ddm Fluidity**
- **>90% Washplant Yield**
- **~1.0 % Sulphur**

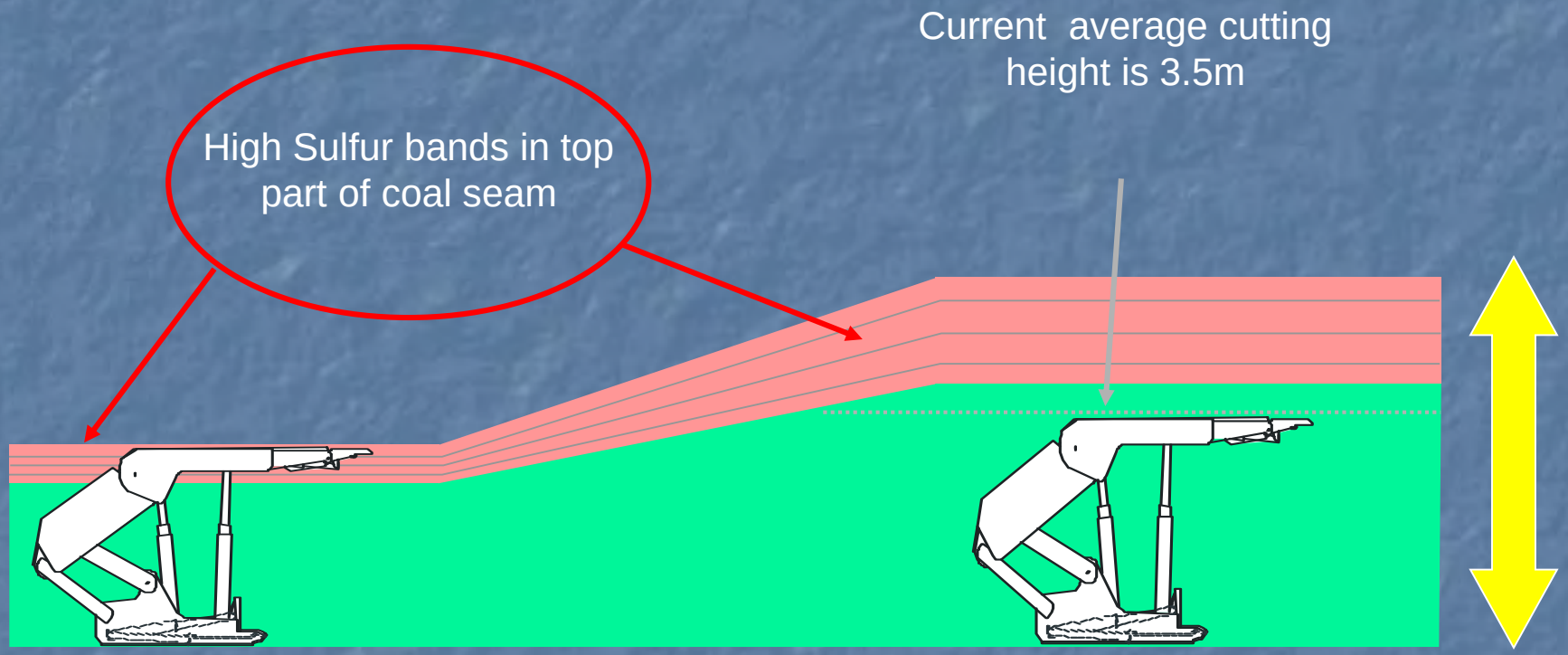
Mine Plan Dec 03



Mining Conditions at Southland

- Intensive Support 10 bolts/m + mesh
- Low gas content <2 m3/t in-situ (80% CO2)
- No Spon Comb events before Dec 03 at Southland
- Goaf make is Blackdamp
- Goaves all sealed with 20psi Micons
- Good longwall face conditions except in shear zones
- 1000tph face -hybrid 1980s-2000
- Mined btm half of 7m seam
- Record 266kT in Nov 03

Differences between Bellbird and Ellalong areas of Greta Seam



Ellalong area (SL1)
3.0 - 4.0m seam height

Bellbird area (SL2)
6.0 – 7.0 m seam height

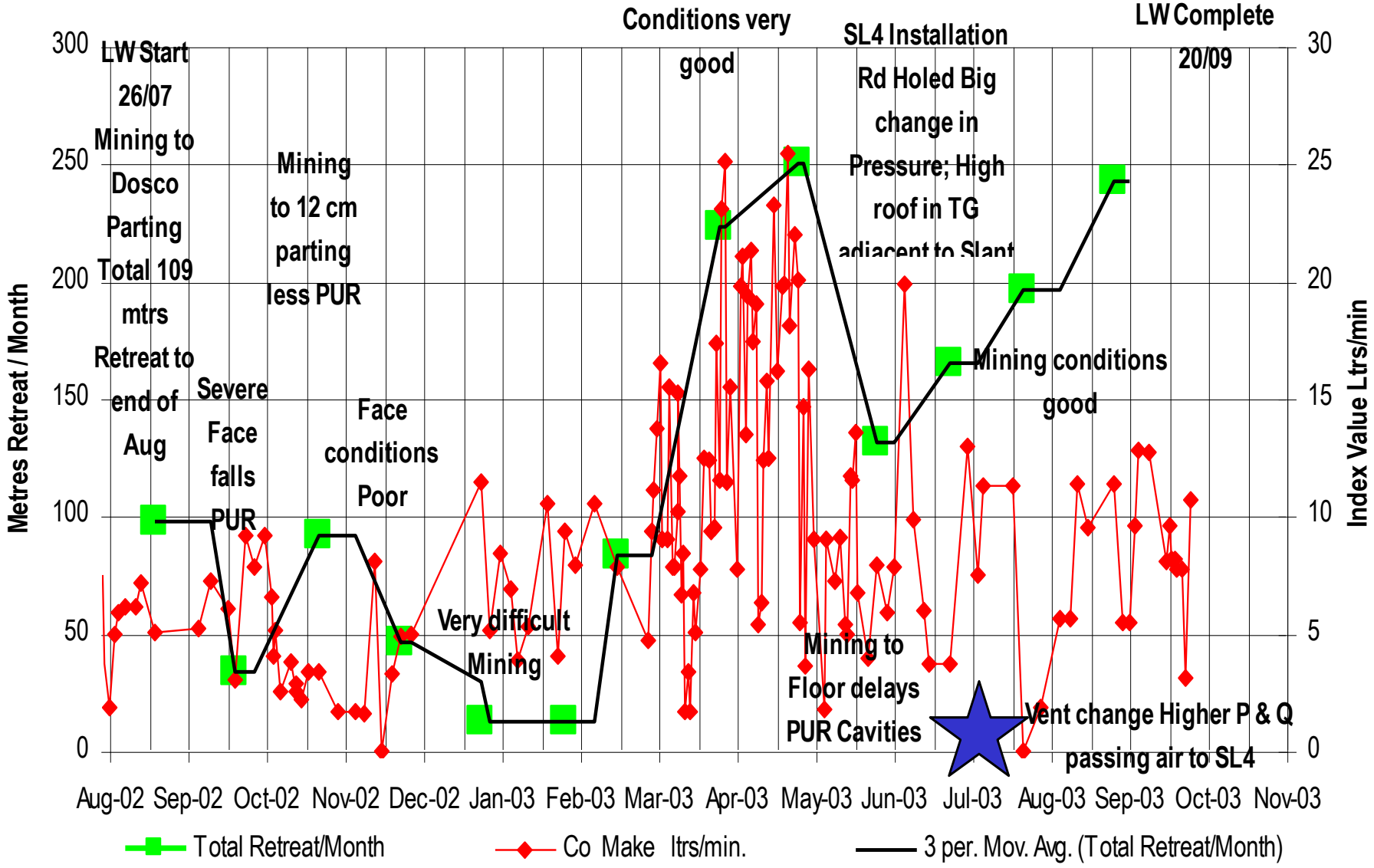
SL4 Longwall Maingate


LW Face Conditions Generally Good


Occasionally not!!

SL3 Tailgate CO Make vs Retreat by Month
Life of Block

From John Brady's analysis



SL4 Longwall Face


TYPICAL
CONDITIONS IN
MAINGATE GOAF
BEHIND #1 SUPPORT.

TYPICAL TAILGATE CONDITIONS LOOKING INBYE

Micon Seal SL4 TG

The Incident

The Incident 22-23 Dec

- 22 Dec 1700: Seal immediately behind the LW face at 17 C/T crushed & high CO alarm in SL4 TG triggered
- 22:00 Upcast shaft alarm 9ppm CO
- 23 Dec: 01:24 high oxygen alarm in goaf
- 02:00 Upcast 30ppm SL4 61 ppm
- Mine Manr instructed to inspect seals, no road return and prepare to repair seals
- Inspection revealed 600ppm at 11c/t seal
- 06:30 Mine Evacuation
- 08:30 Inspection Team repaired seal 17 c/t and installed 14 c/t gas monitoring line, reported tarry smell at 14 c/t
- 14:00 Mobile Gas Chromatograph set up
- 16:00 DMR imposed s.63 on mine preventing further access underground

The Incident 24-28 Dec

- 24 Dec : 1600 Reduced air over heating by turning fan down to TG calc as 26 m3/s
- 1800: black smoke billowing from #3 shaft; 108ppm CO in fan evasee (over 400 lpm)
- GAG jet engine requested from QMRS
- Barriers erected at #3 shaft area and sentries posted
- 25 Dec 02:00 Exclusion zones established around all entries
- 03:25 “Active Fire consuming immense amount of oxygen”
- 05:20 White smoke billowing from #3 shaft
- 23:00 GAG Engine arrived on site
- 26 Dec 04:30 Explosive Gas Range in SL4 TG
- 27-28 Dec: GAG run


#3 Shaft SOUTHLAND 7.40pm 24/12/03
24/12/2003


Southland Colliery #3 Shaft 8am
25/12/03
25/12/2003


Tar at Fan Site emitted
from Upcast Shaft
30/12/200


25/12/2003

GAG Used 27-29 Dec 04

The Incident 29 Dec-21 Jan

- **29 Dec : 09:47 Fan stopped due to overload and would not restart**
- **10:15 Turned GAG off**
- **20:00 Temporary Seals installed on Mine Entries**
- **30 Dec: 0800 GAG demobilised & seals made more airtight**
- **31 Dec-21 Jan: Mine naturally inertising**
- **21 Jan 04: Ventilation rearranged in mine with temp #1 upcast shaft using auxiliary fan to degas drift & outbye workings**

The Incident 21 Jan-6 Feb 04

- **24 -30 Jan: # 3 shaft Aux fan 3m3/s . Signs of reactivation so shut down**
- **Late Jan-early Feb : Staged Re-Entry plan formulated**
- **6 Feb: Reentry Commenced in Drift with #1 Fan 18m3/s and stagnant inbye workings**
- **Jan-Feb 04: 5 boreholes drilled**
  - **4 in TG for sampling & possible flyash seals**
  - **1 in Goaf for possible inertisation using Tomlinson Boiler**

Drift Temporary Seal 31 December 03 using loam

Gas Samples Examples SL4TG

Gas %	CO	CO2	CH4	C2H4	H2	O2
27/12a	5	8	6	0.7	8	4
27/12b	2	4	2.5	0.3	4	12

Re-Entry

Stages of re-entry

- Originally 10 stages planned to full mine recovery
- All stages fully risk-assessed one at a time
- BB Mains almost a “water seal”
- Outbye upcast shaft re-activated using aux fan
- Fresh air conditions -O2 rescuers carried
- Recovered 1 pillar at a time

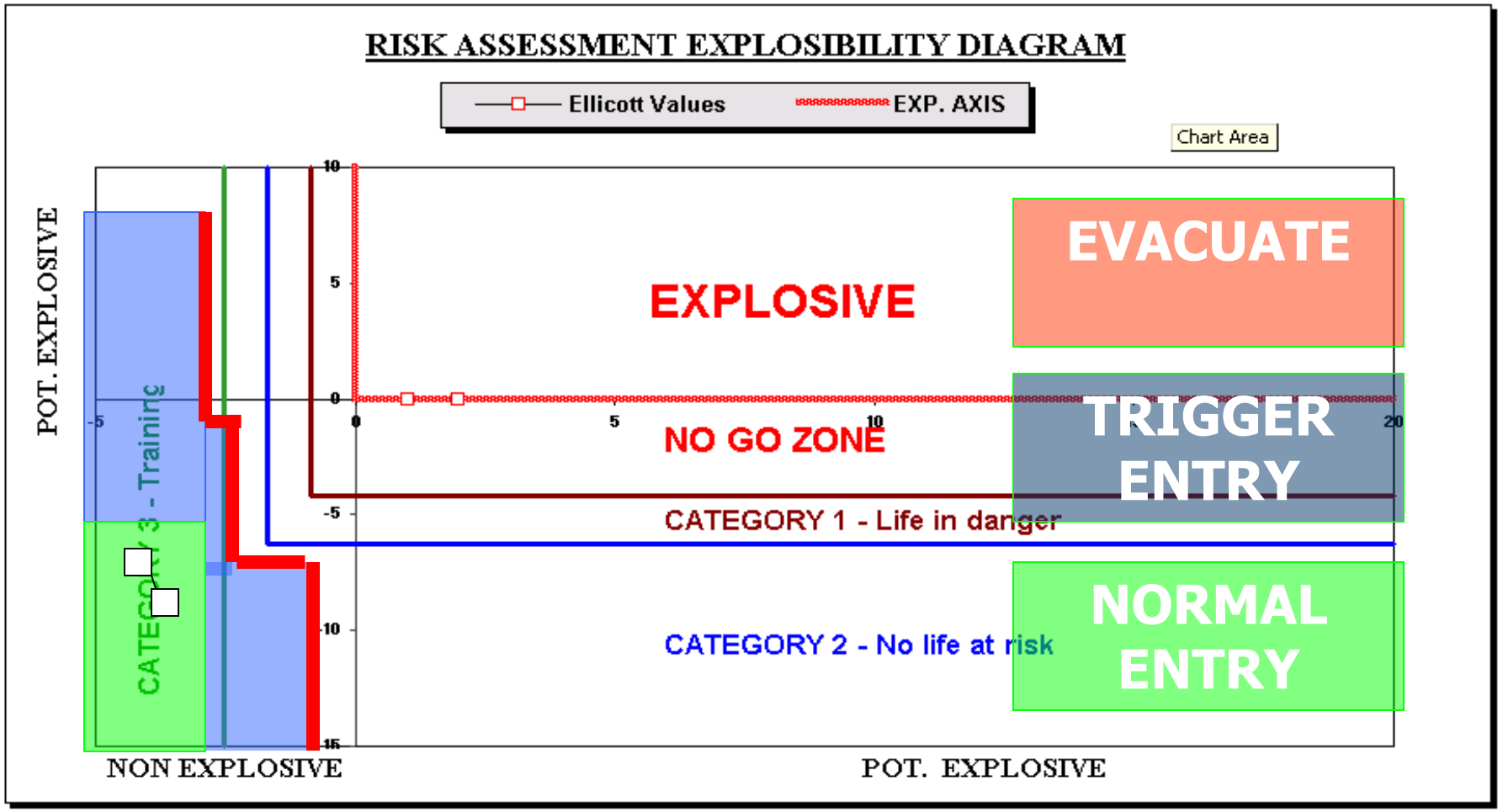
Re-Entry summary

- 6-16 Feb: Mine ventilated to Bellbird Mains & pumping of flooded roadways commenced
- 22 Feb: TG sealed from UG
- 26 Feb: MG temp seals in place
- 27Feb- recovering MG travel road using belt road as sewer return
- 1 March : coked roof coal found at 4 c/t
- 11 March: Secondary Fire & Fall at 7c/t + Fall 6c/t
- 11 March: MG resealed at 1 c/t
- 16 March: SL5 Dev CM found buried
- 17 March: Workforce retrenched & mine prepared for c&m

Evac Triggers during re-entry

- Mine Fan #1 shaft , #3 fan sealed
- Gas Monitoring working
  - Bag Sampling Regime(s)
- Gas Results
  - Look at all points, Tube Bundle
  - Triggers on the set of LW data points
  - Mines Rescue Guidelines
    - Ellicott's diagram
    - Combustion gas trends
    - Tube bundle triggers

Recalc Graphs

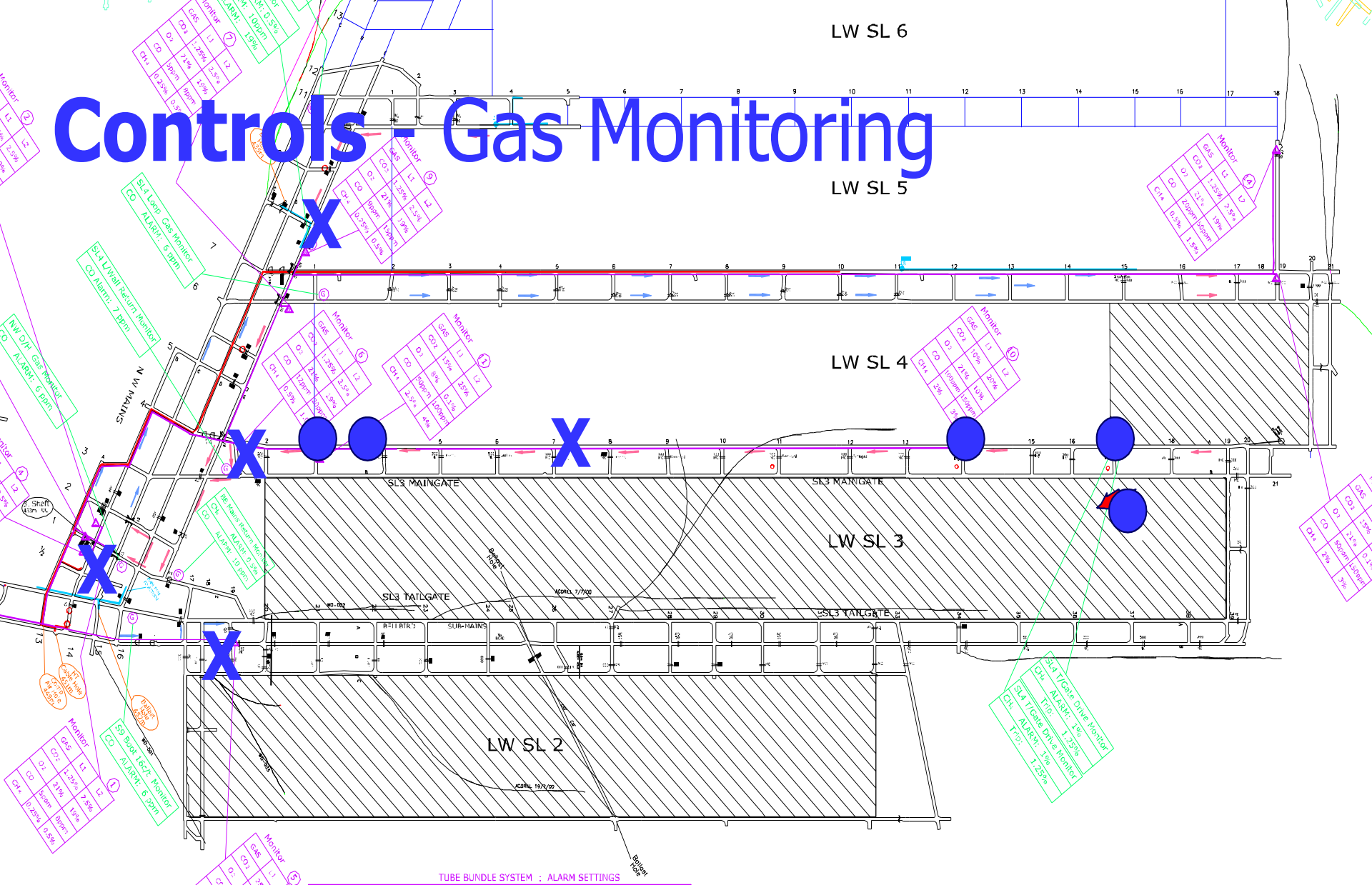


RESULTS | HELP INFORMATION | AIR FREE | CH4 FREE | FLAMMABILITY DATA | RATIOS | EXPLOSIBILITY ASSESSMENT | GRAHAM'S_YOUNG'S RATIOS

Ready

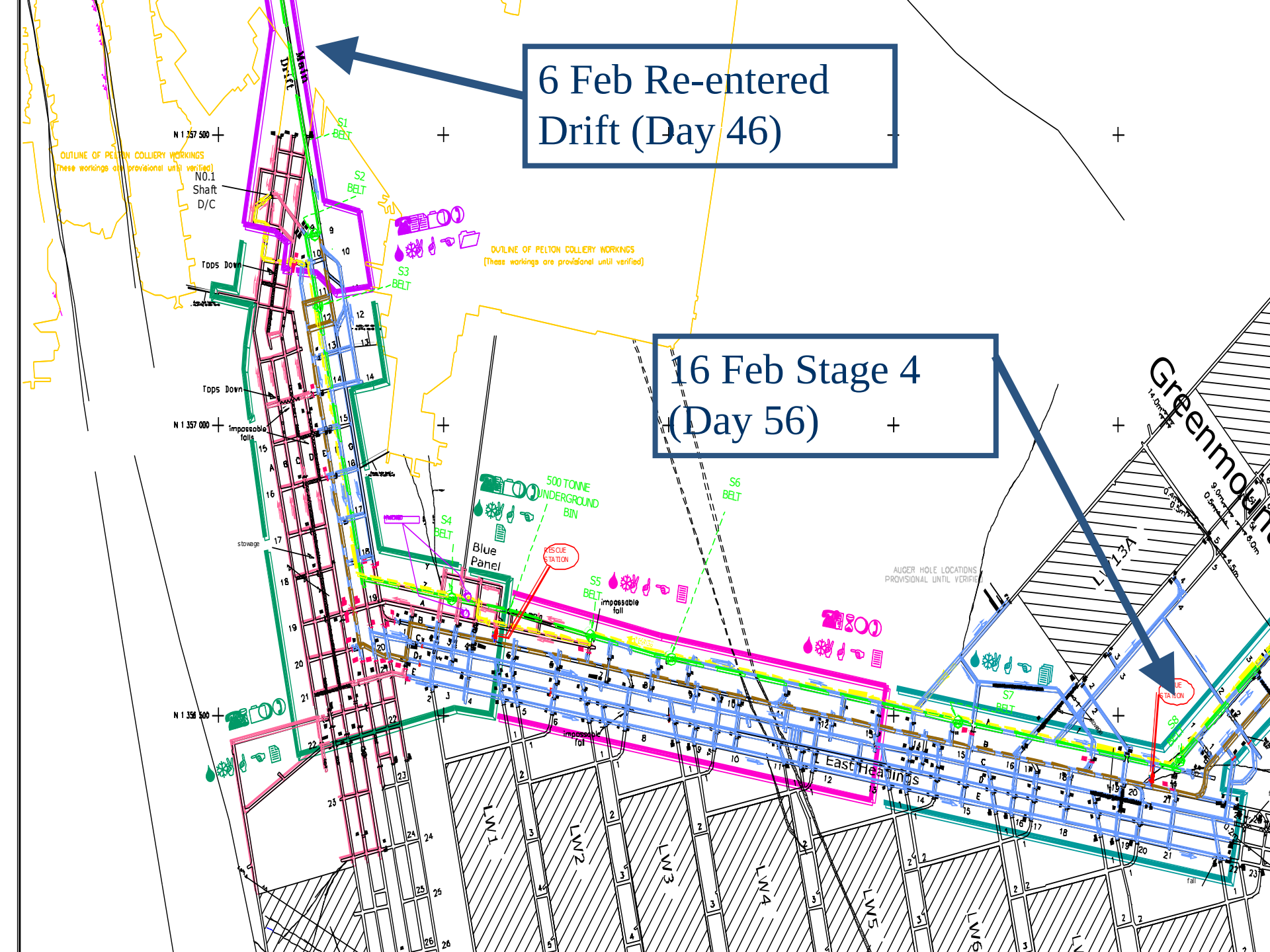
Start | Y:\Fire\Ar... | Inbox - Mi... | Microsoft ... | TCN-0800... | Inbye Foc... | Smartm... | Smartmat...

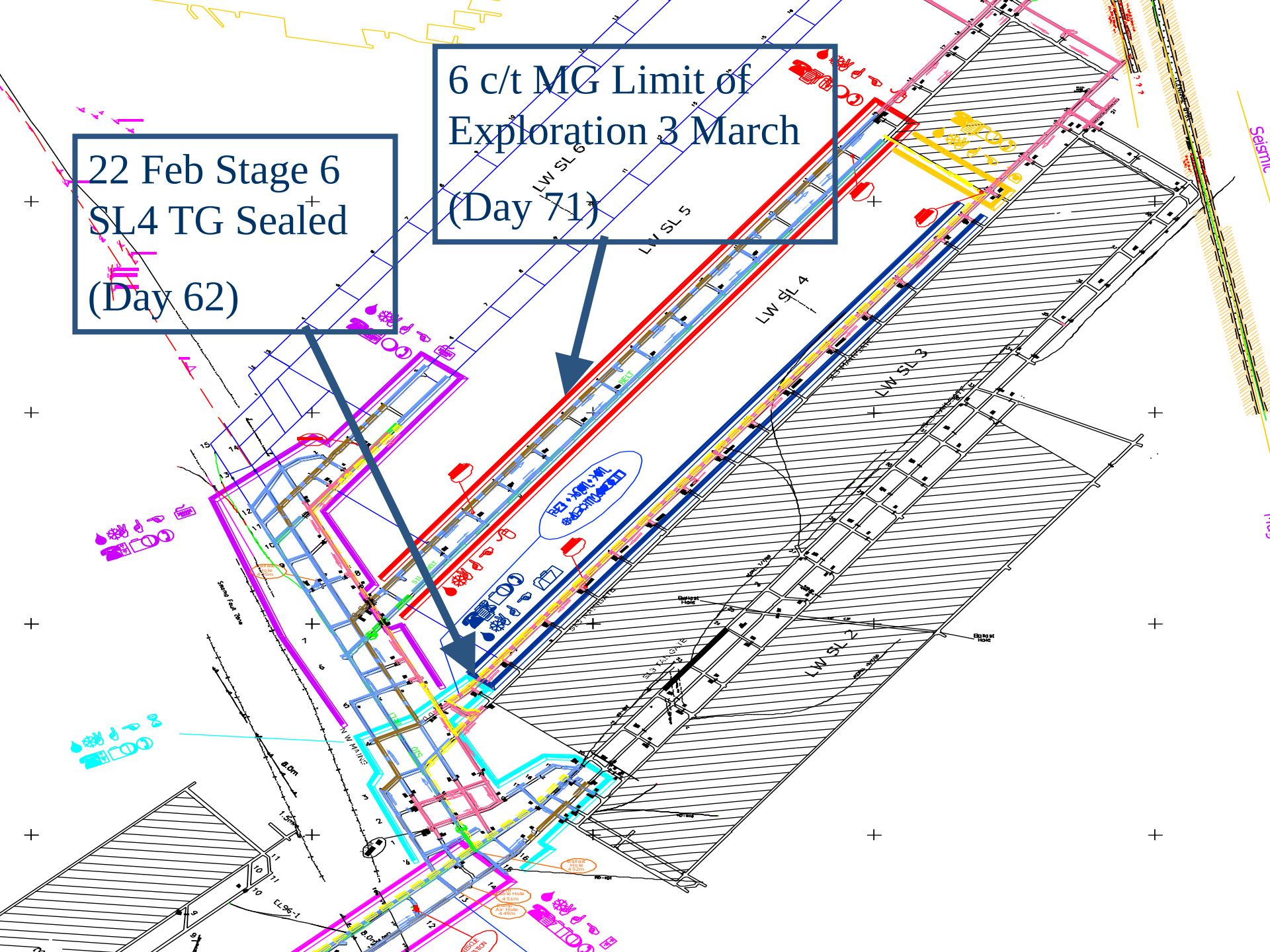
Controls - Gas Monitoring



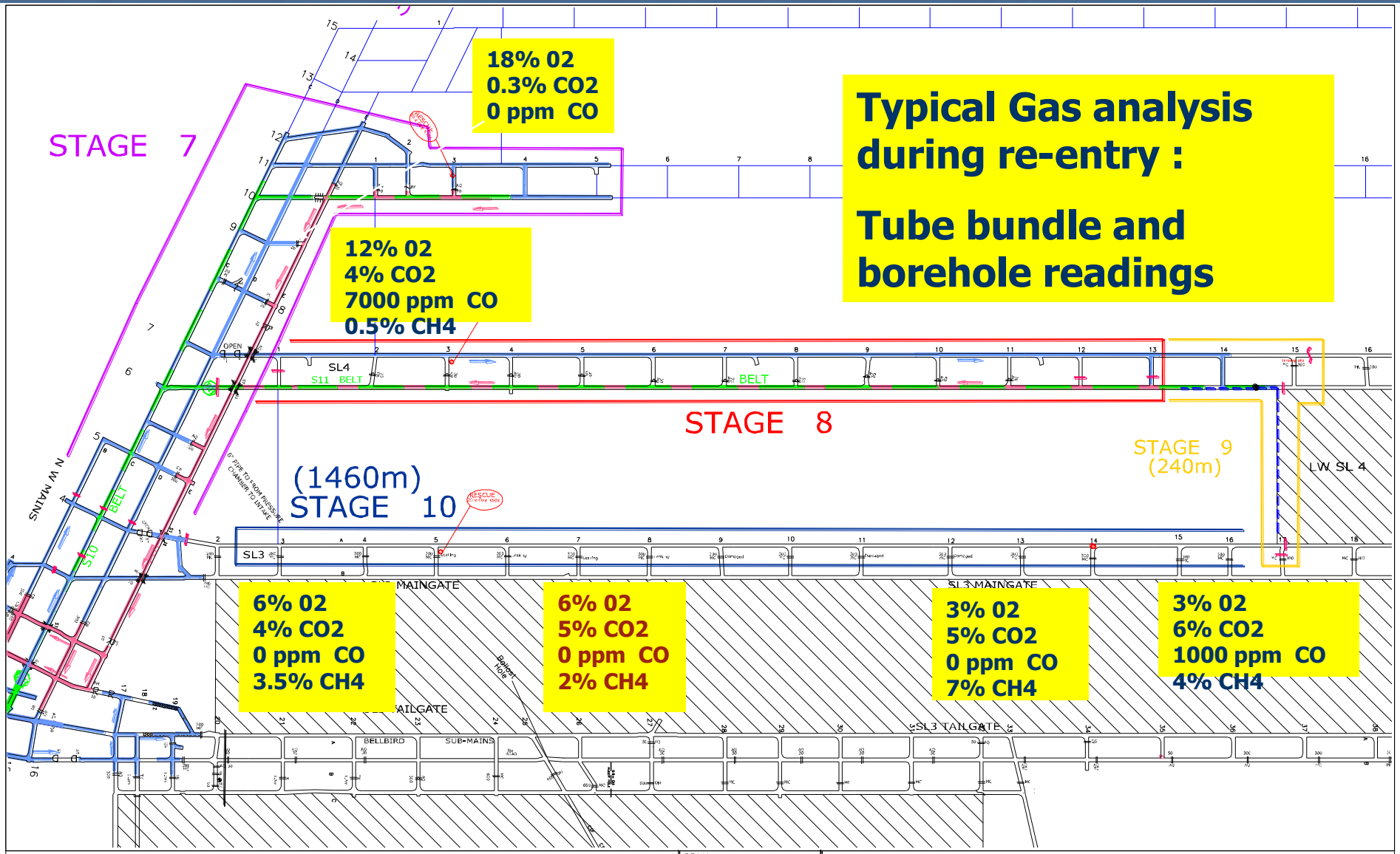
TUBE BUNDLE SYSTEM : ALARM SETTINGS

SAMPLE	LOCATION	CO L1	CO L2	O2 L1	O2 L2	CO L1	CO L2	CH4 L1	CH4 L2
1	LW/C Shaft : C/T B Cr Hdg	1.25%	2.5%	21%	19%	5ppm	8ppm	0.25%	0.5%
2	LW/C Shaft B Hdg 1/2 c t	1.25%	2.5%	21%	19%	5ppm	8ppm	0.25%	0.5%
3	LW/C Shaft : C/T A B Hdg	1.25%	2.5%	21%	19%	5ppm	8ppm	0.25%	0.5%
4	LW/C Shaft B Hdg 1/2 to 1 c t	1.25%	2.5%	21%	19%	5ppm	8ppm	0.25%	0.5%
5	B&M B19 Goaf Seal	25%	30%	8%	0.1%	30ppm	50ppm	5%	10%
6	LW SL4 Return (SL3 At =A2)	1.25%	2.5%	21%	19%	12ppm	20ppm	0.5%	1.0%
7	SL4 30-B1 (SPARE)	1.25%	2.5%	21%	19%	5ppm	8ppm	0.25%	0.5%
8	B/MAIN Transport Road 11c/t SW Mains	1.25%	2.5%	21%	19%	4ppm	7ppm	0.25%	0.5%


6 Feb Re-entered Drift (Day 46)
16 Feb Stage 4 (Day 56)
Main Drift
S1 BELT
S2 BELT
S3 BELT
S4 BELT
S5 BELT
S6 BELT
S7 BELT
OUTLINE OF PELTON COLLIERY WORKINGS
(These workings are provisional until verified)
NO.1 Shaft D/C
Tops Down
impassable falls
stowage
500 TONNE UNDERGROUND BIN
Blue Panel
RESCUE STATION
impassable fall
AUGER HOLE LOCATIONS PROVISIONAL UNTIL VERIFIED
East Headings
LW1
LW2
LW3
LW4
LW5
Greenmoor


22 Feb Stage 6
SL4 TG Sealed
(Day 62)
6 c/t MG Limit of
Exploration 3 March
(Day 71)
LW SL 6
LW SL 5
LW SL 4
LW SL 3
LW SL 2

The initial SL4 TG Seal installed during re-entry



DRAWN	D.JOLLIFFE	SOUTHLAND MINE	
DATE	19/2/04	TITLE	Stage 10 Recovery of Mine TCN-0800-SL4-PF0040-Stage 10 Recovery
CHECKED			
APPROVED		SCALE 1:5000	DRAWING No. Pitfire/RECOVERYstages A3

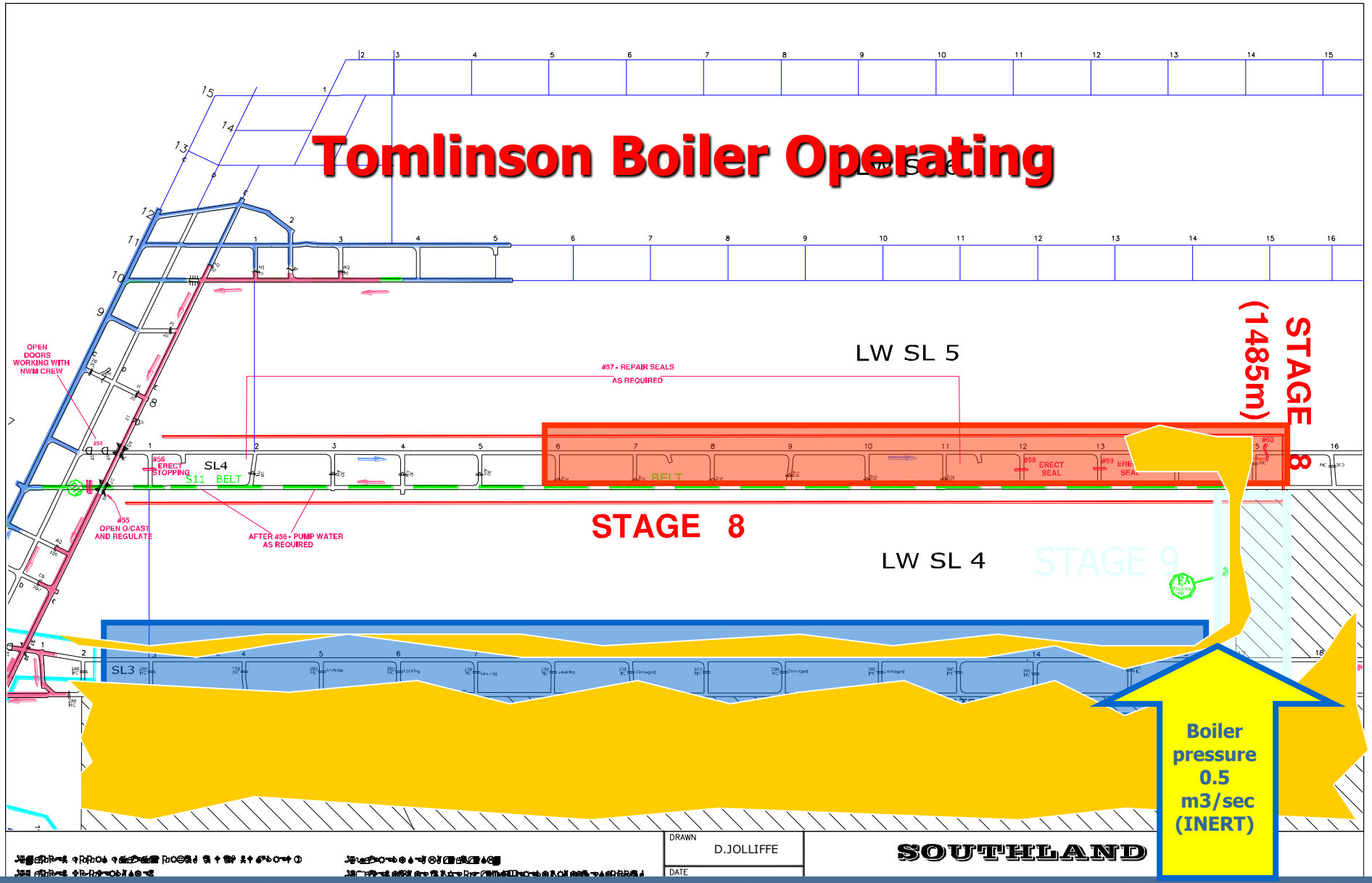
SOUTHLAND ALLIANCE

Stage 8

- Recovered slowly to 6c/t
- CO & CO2 make not reducing
- Tomlinson Boiler used from TG side
- Secondary fire sighted at 7c/t in a fall of tops (?)
- 6 c/t fall of ground overnight
- MG sealed at 1c/t and mine evacuated
- Gas levels receded after sealing
- Permanent seals installed in MG & TG.

Inertisation Using Tomlison Boiler

Tomlinson Boiler Operating



The Damage Found

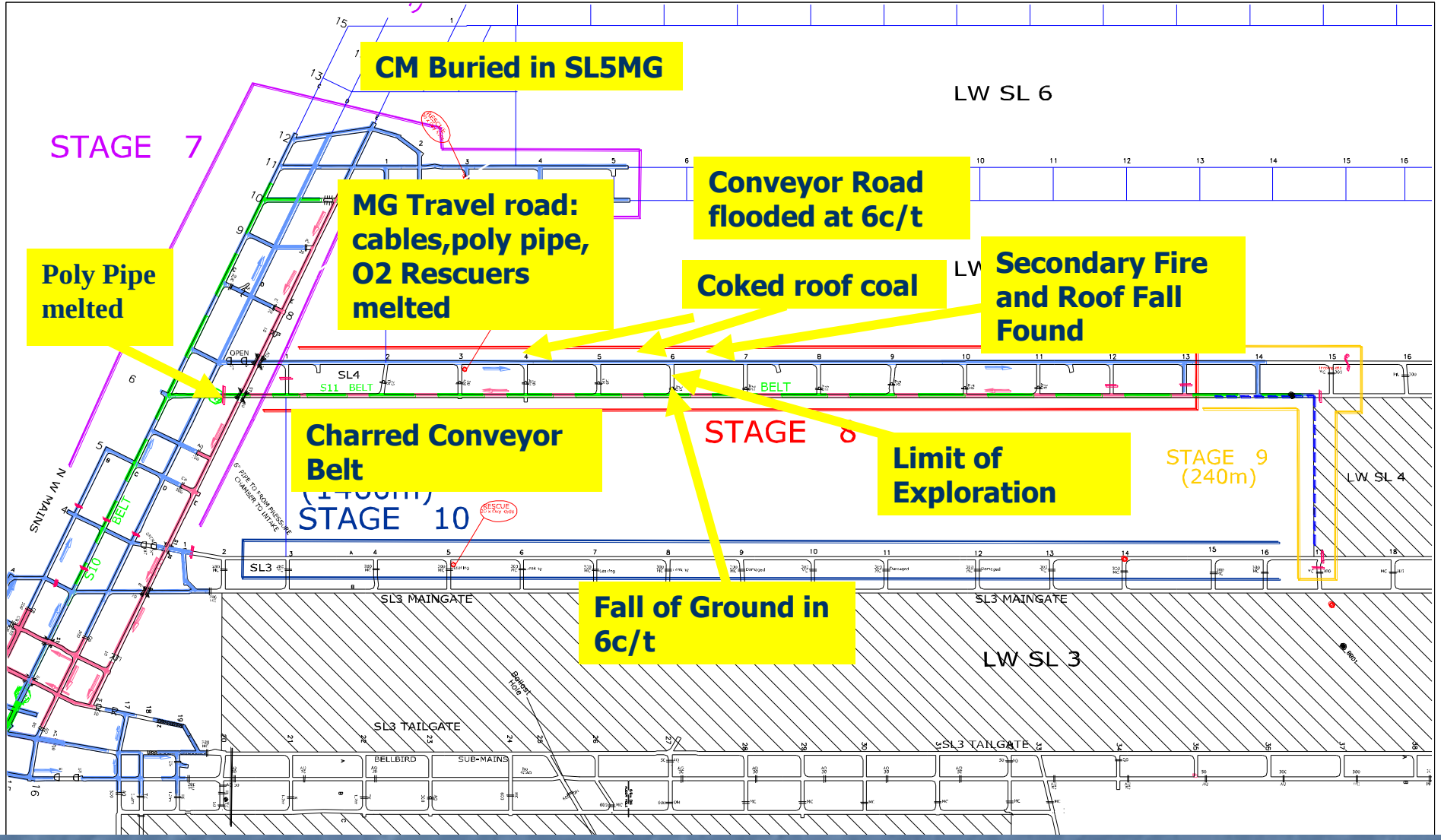

Outbye North-West mains: No fire damage


No fire damage to inbye doors

No Damage to Eimco in NorthWest outbye SL4 MG

Heat Effects Found to 6c/t SL4 MG

- Poly Pipe, Cables melted
- Coal coked in places in roof
- Internal rubbers on Victaulic clamps carbonised
- Pump parts melted & timber charred
- Oxy Self Rescuer casings melted
- All indicative of low Oxygen high temp “flue” effect of a very intense fire

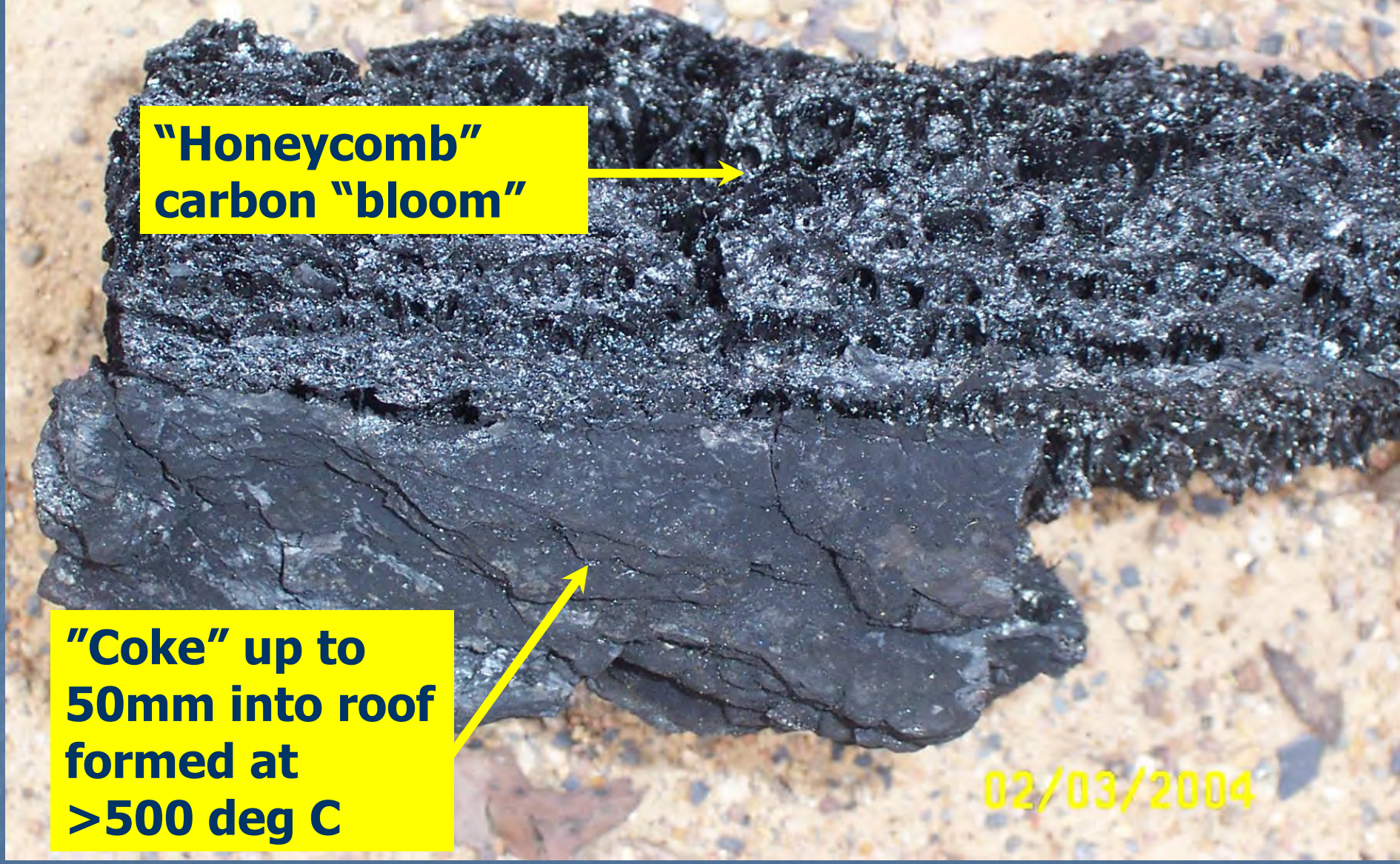


Major Damage Found


Poly Pipe
melted found
1700 m
outbye face

Coked Coal in Roof of Maingate 4c/t

Found at 4c/t Travel Road MG



"carbon bloom" on roof inbye 4c/t MG travel road

SL4 Travel Road 3-4 C/T : Poly Pipe with steel valve

Pitch-like Coating developed on mesh &
Flexibolt 4-5c/t

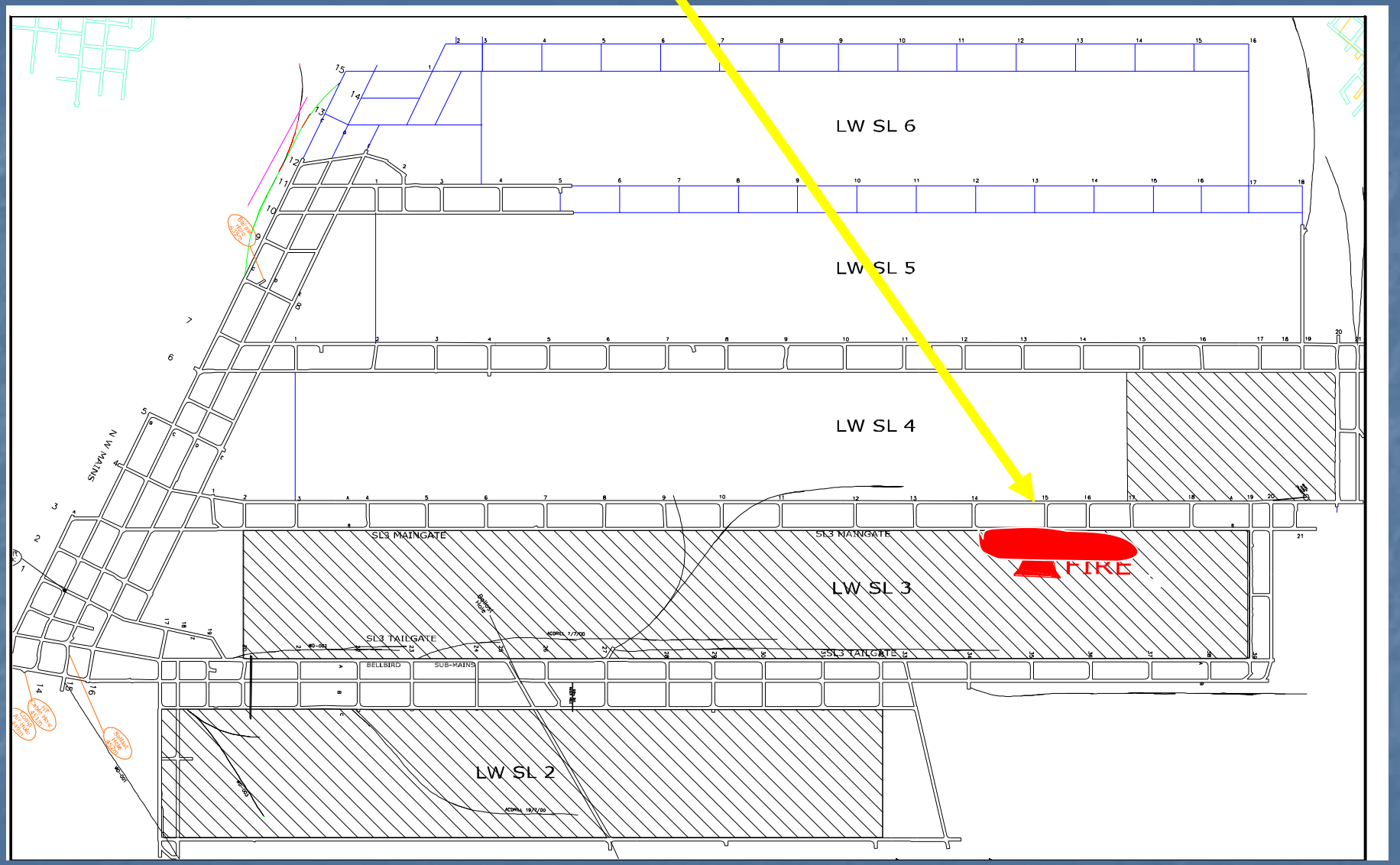

150mm victaulic clamp:
internal sealing rubber destroyed

SL5 Belt starter PLC screen showing damage by heat – location 8 C/T NW

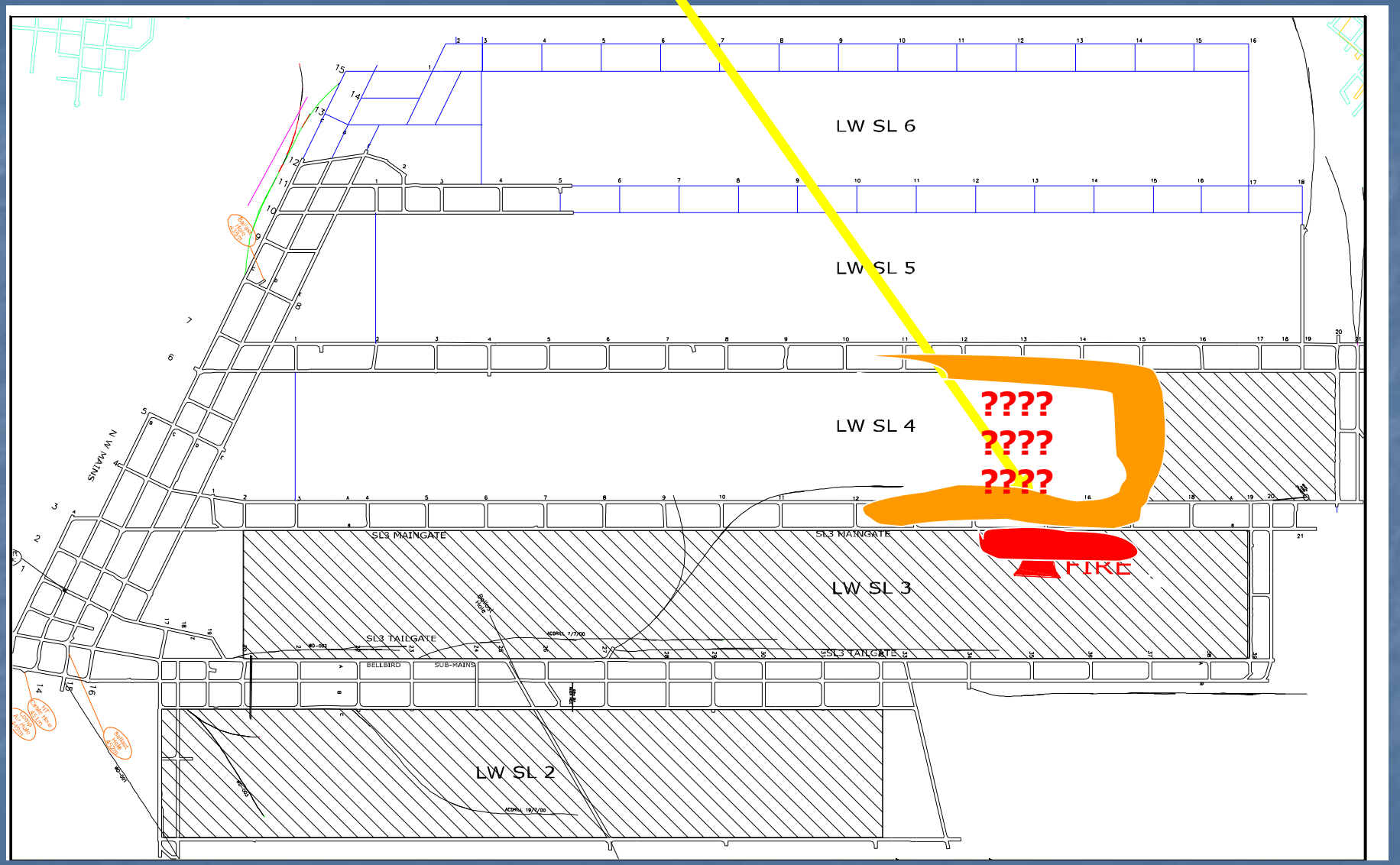
Remains of Oxy Self-Rescuer from Cache at 3/ct


ABM20 Buried in SL5 MG

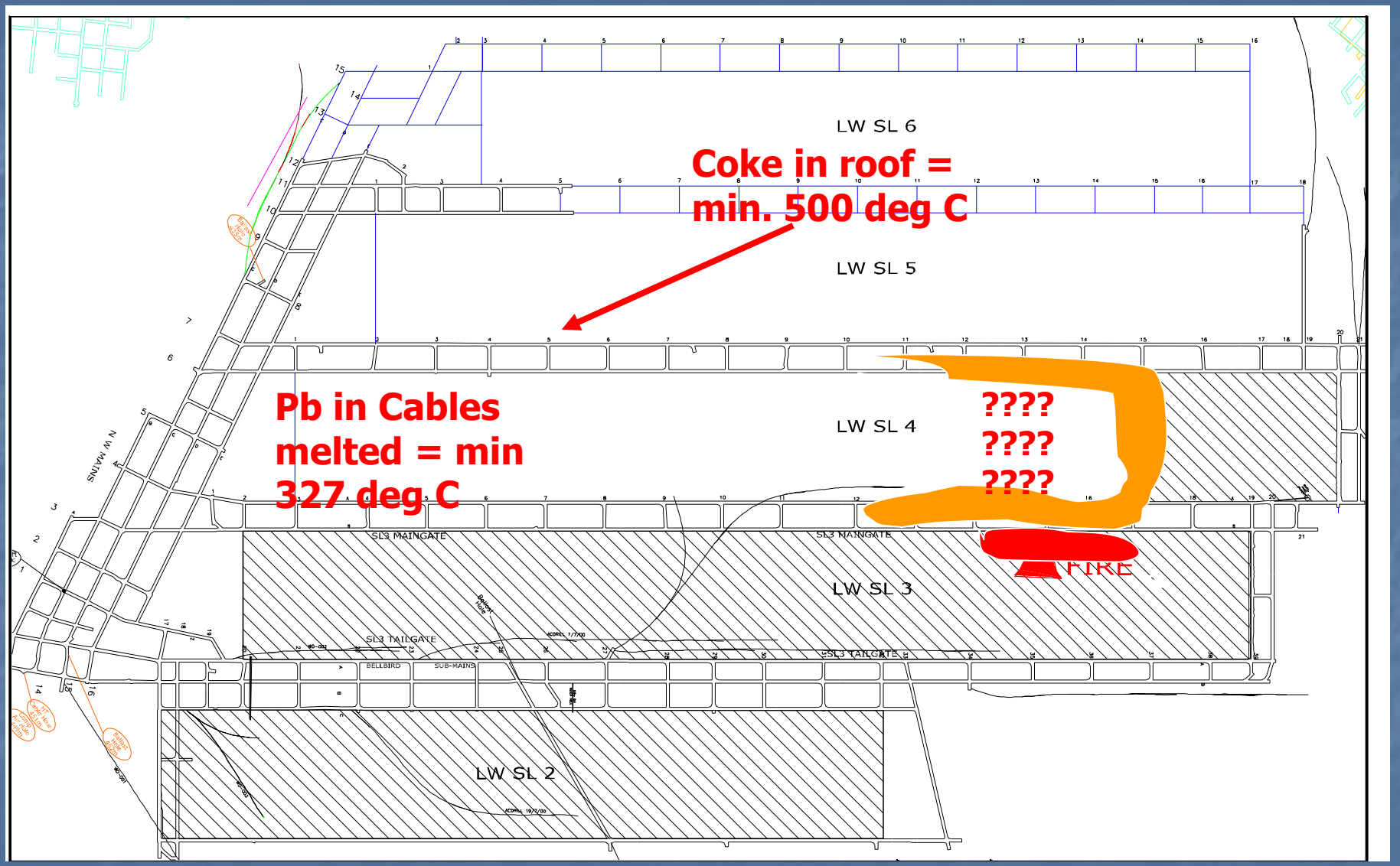
Where did the fire start?



Where did the fire finish?



How hot ?


LW SL 6
Coke in roof =
min. 500 deg C
LW SL 5
Pb in Cables
melted = min
327 deg C
LW SL 4
????
????
????
SL3 MAINGATE
SL3 MAINGATE
FIRE
LW SL 3
SL3 TAILGATE
SL3 TAILGATE
BELLBIRD
SUB-MAINS
LW SL 2

How intense was the fire?

- Using MSHA method
- Only reliable air Q was upcast shaft
- Based on H/C ratios etc
- Approx 12 tonnes per hour for 5 days = 1400 tonnes
- Heat energy to Boil off 200 litre drum water every 3 minutes

ABM 20 RECOVERY

AT SOUTHLAND COLLIERY

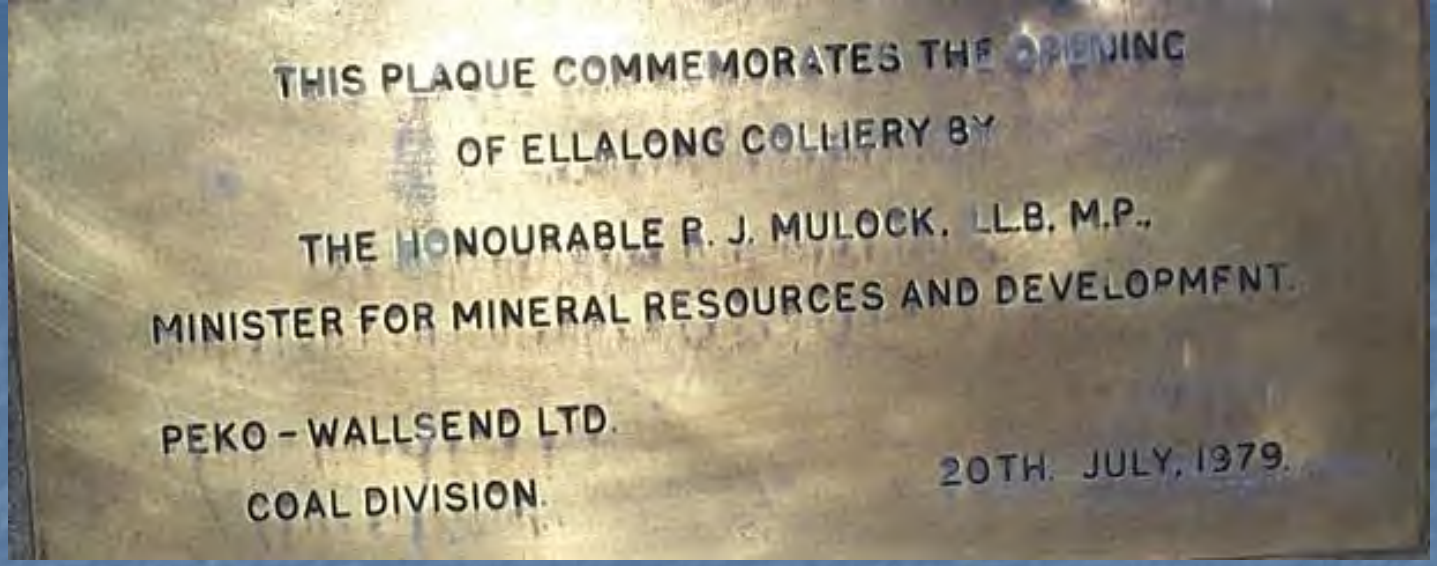
2004-5

The Future

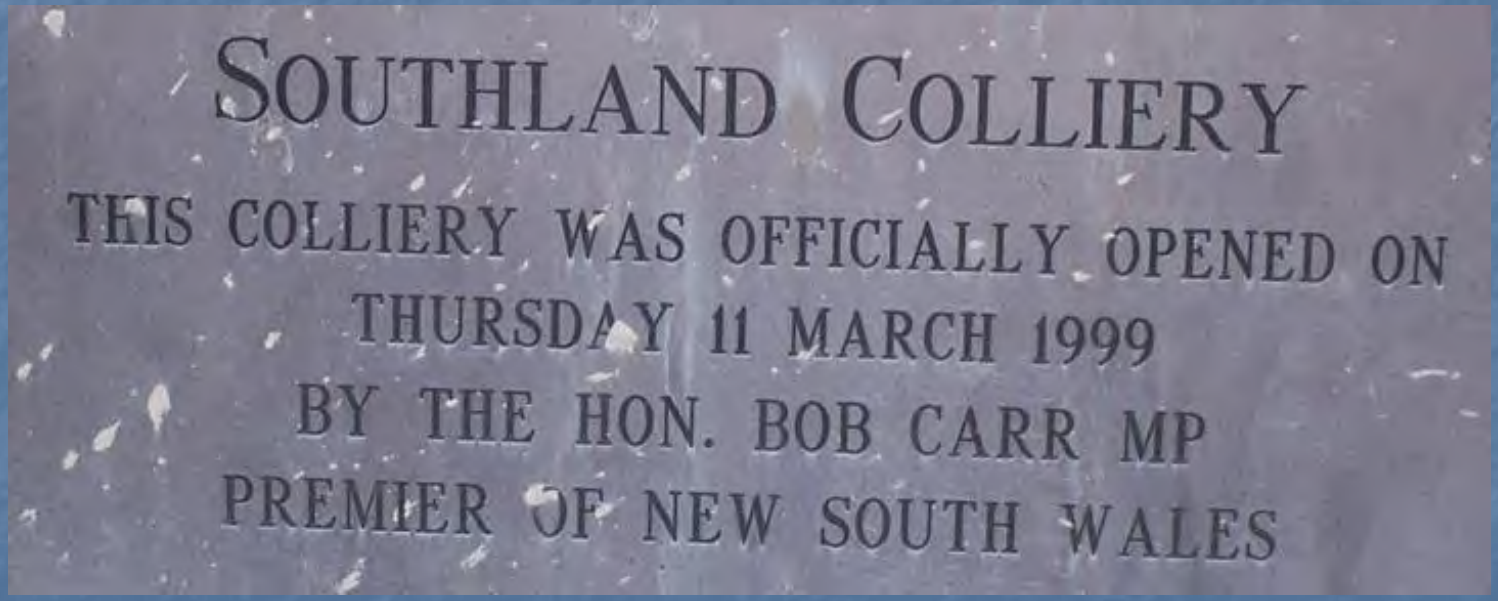
- Sold to Yanzhou in Dec 2004
- Renamed “Austar Coal Mine”
- Plans for LW Top Caving
- Plans to mine to 1000m depth
- Initially 2.5 mtpa up to 4 mtpa
- Development recommences in May 2005

Austar ABM20

1


THIS PLAQUE COMMEMORATES THE OPENING
OF ELLALONG COLLIERY BY
THE HONOURABLE R. J. MULOCK, LL.B, M.P.,
MINISTER FOR MINERAL RESOURCES AND DEVELOPMENT.
PEKO - WALLSEND LTD.
COAL DIVISION.
20TH JULY, 1979.

2


SOUTHLAND COLLIERY
THIS COLLIERY WAS OFFICIALLY OPENED ON
THURSDAY 11 MARCH 1999
BY THE HON. BOB CARR MP
PREMIER OF NEW SOUTH WALES

- END