

## <u>Disclaimer</u>

To date no "official" report has been released concerning this incident and investigations are ongoing.

The following presentation is based upon information drawn from numerous sources available in the public domain.

Whilst every effort has been made to substantiate the information the author claims no guarantee that all the information presented is totally accurate.

This presentation is intended to inform the industry and not to pass judgment on any persons actions or decisions.

The views expressed are those of the author and should not be construed as reflecting those of the NSW Mines Rescue Service.

**Peter Robbins** 

# **Overview of Mine**

**Location and Operation** 

#### **Pike River Mine**

West coast of NZ's South Island

Mines the Brunner Seam in the Pike River Coalfield

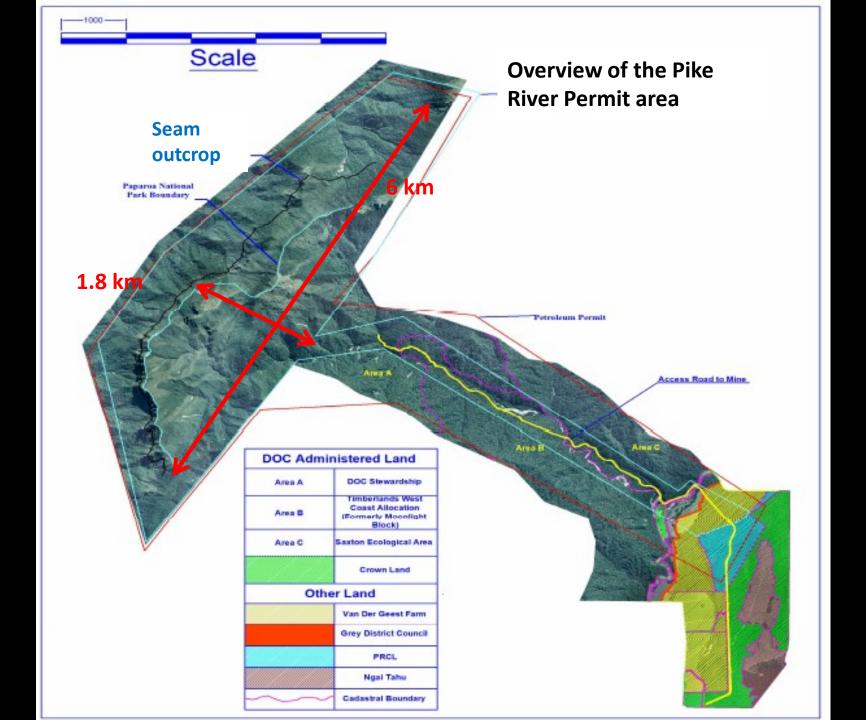
Production: target 1.0 MTPY

method – CM & pillar extraction (hydraulic)



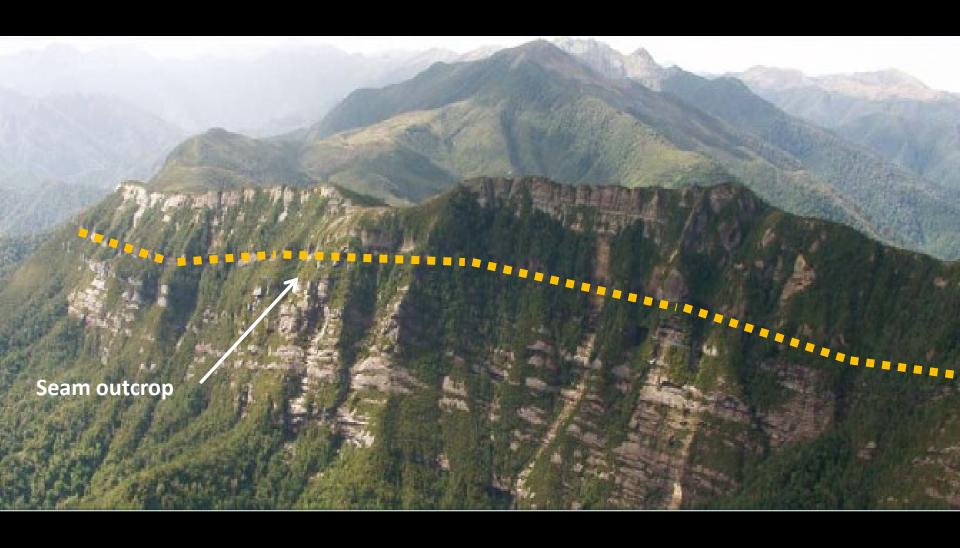


Mine is located in the Paparoa Ranges
Topography , National Park & Conservation areas restrict surface access



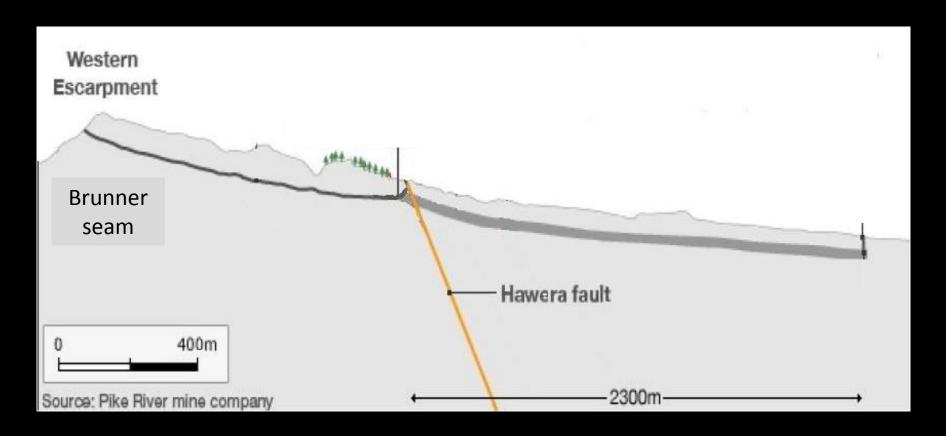
#### **Brunner Seam properties**

- Depth of cover 110 to 180m
- High quality coking coal (very low ash & sulphur)
- 8 9m thick (average)
- Gradient variable ( $5 15^0$ )
- Spontaneous combustion propensity (Moderate)
- Gas content approx 4 9 m³/t (methane)



Western escarpment of Paparoa Ranges

# **Pike River Mine**

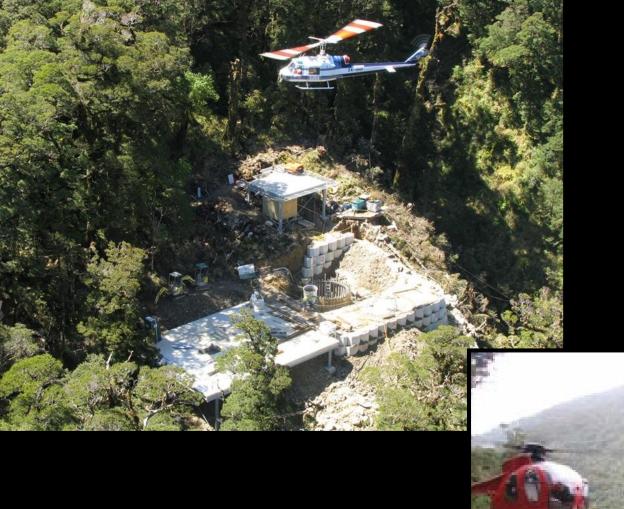


- Mine accessed by 2.3km stone drift (1 in 11 grade)
- Ventilated by single upcast shaft
- Main mine fan at base of shaft 125m³/s









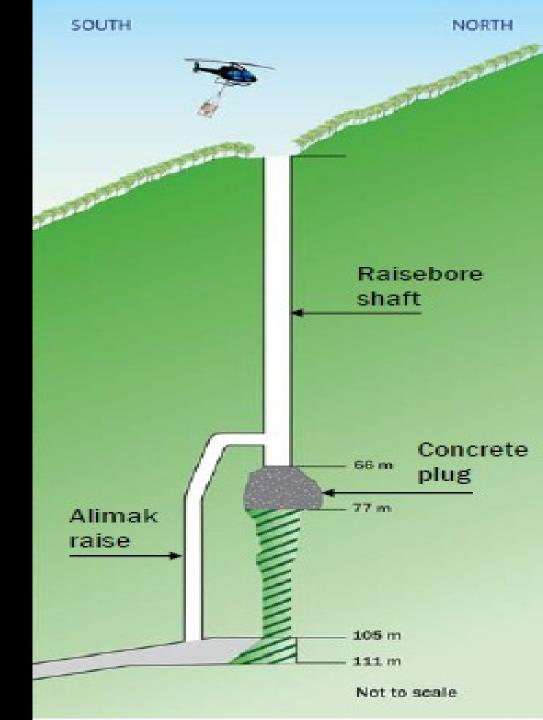
## **Main Vent shaft**

- 4.2 m diameter
- 106 m deep
- No road access



#### **Main Vent shaft**

- Rib failure at base of shaft
- 30m shaft blocked
- Shaft plugged and bypass raise driven (2.8 x 2.8)





## **Slim line Vent shaft**

- 600 mm diameter
- 100 mm Gas drainage riser (approx 150 200l/sec)



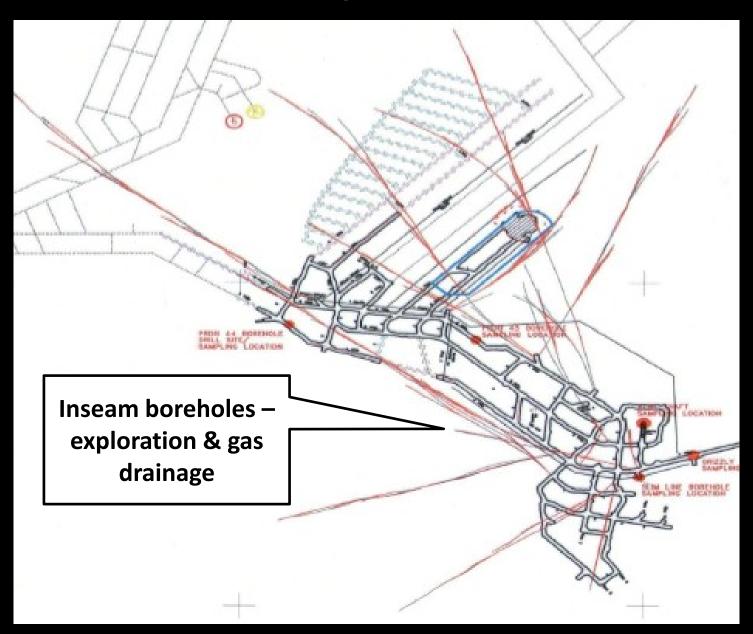
Mine offices, bathroom, workshop and store – 1.2km from portal



# **Coal preparation and handling**

Coal transported via slurry pipe 8 km to washery located outside conservation area.







#### **Development equipment**

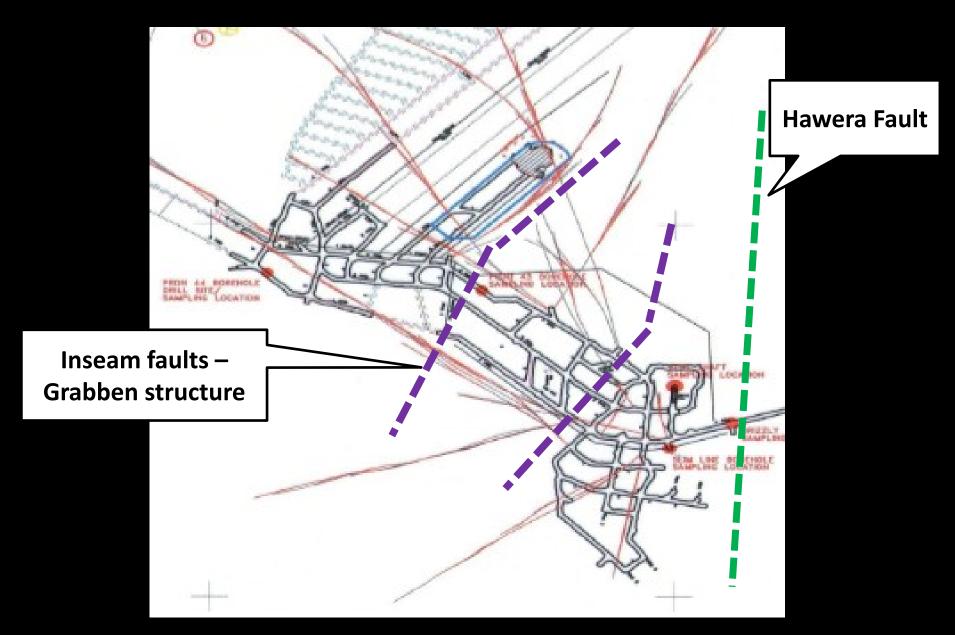
Road header & Continuous Miner

Diesel Ramcars





# The Mining Process – Geology

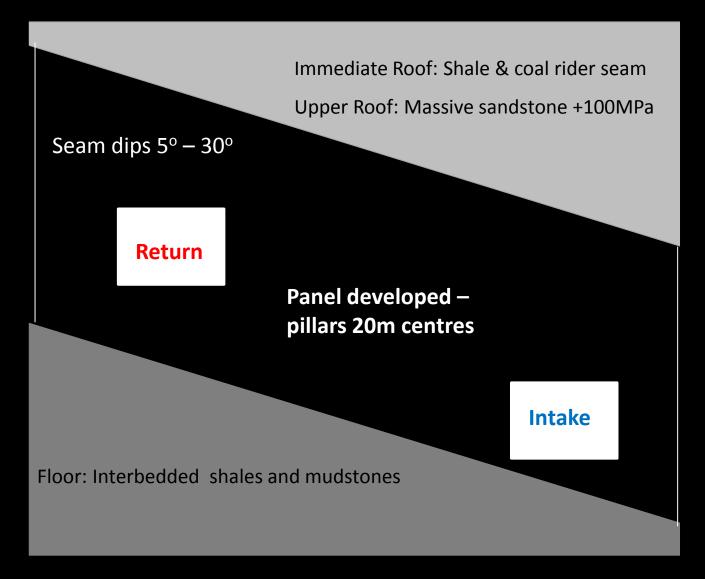




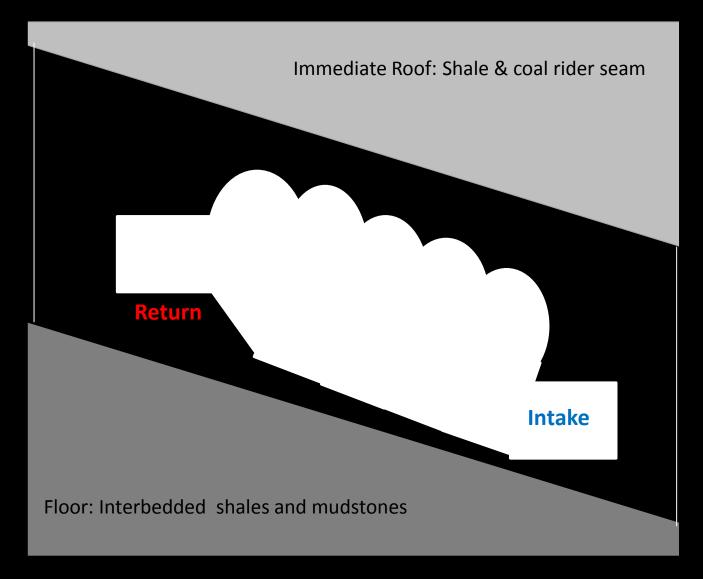
#### **Hydraulic Extraction equipment**

High pressure water cannon & flume transport Guzzler to size coal and direct into flumes

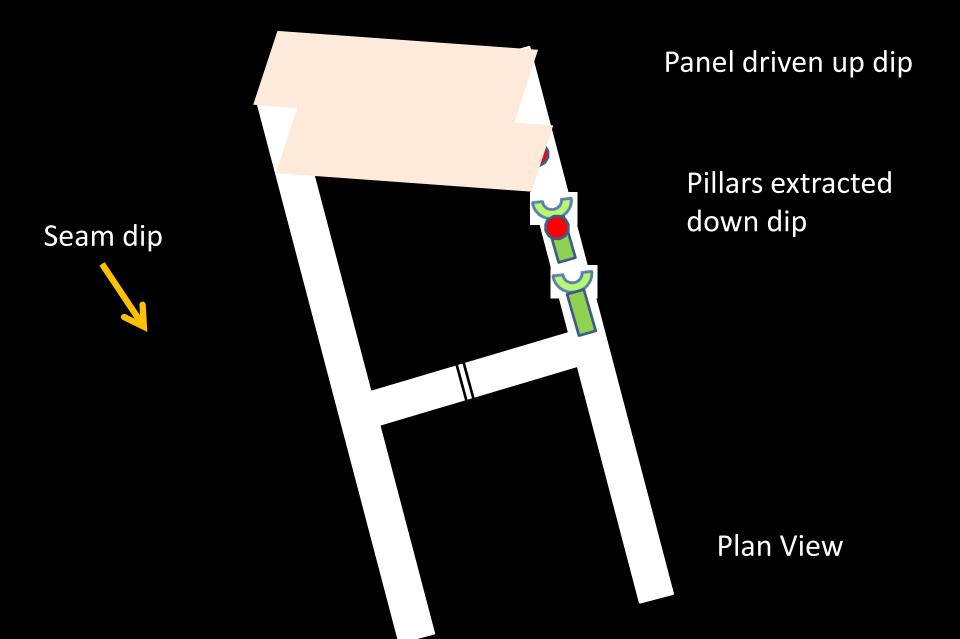


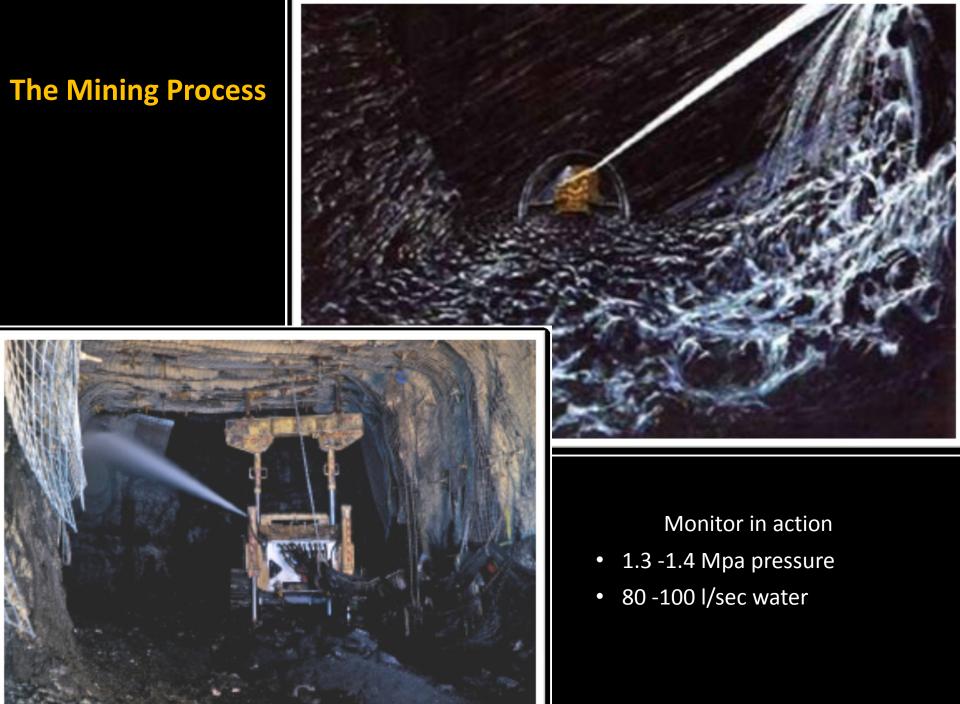


**Seam cross section** 

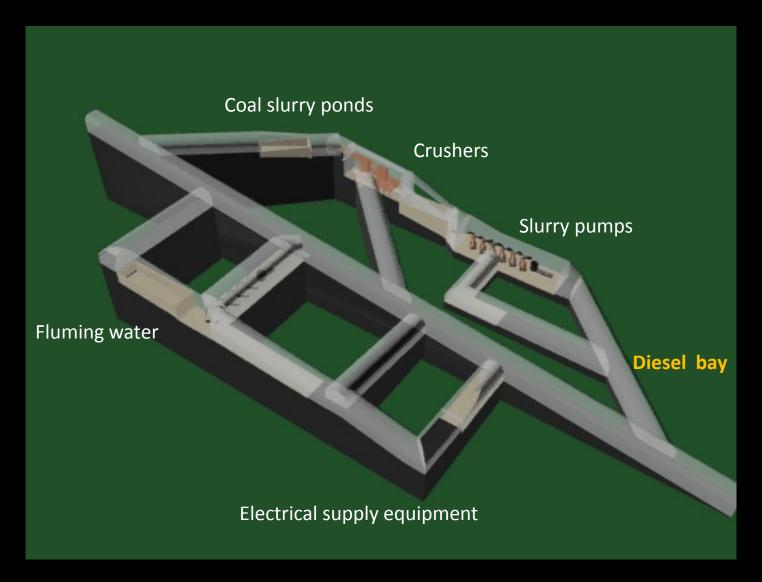


Hydro pillar extraction – Pillar extracted between Intake and return

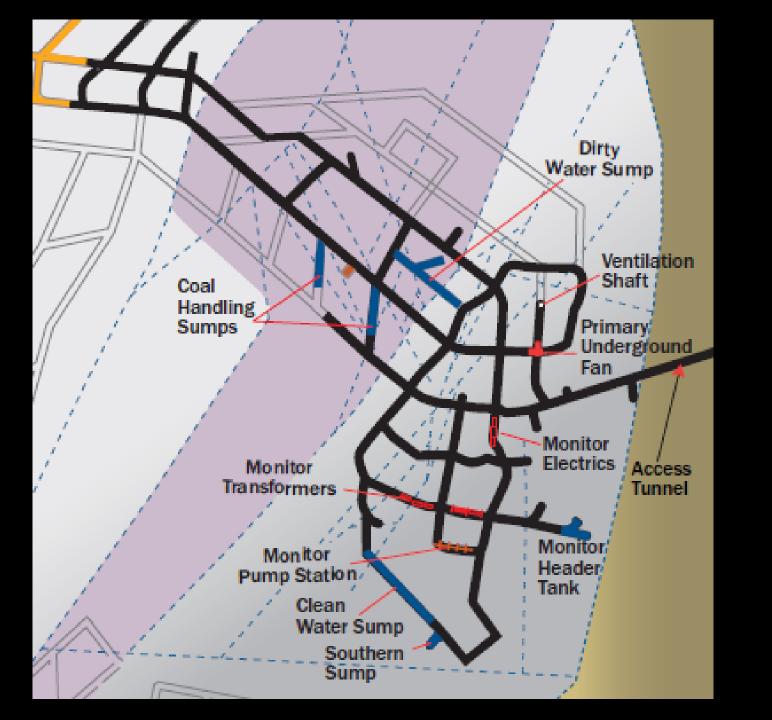


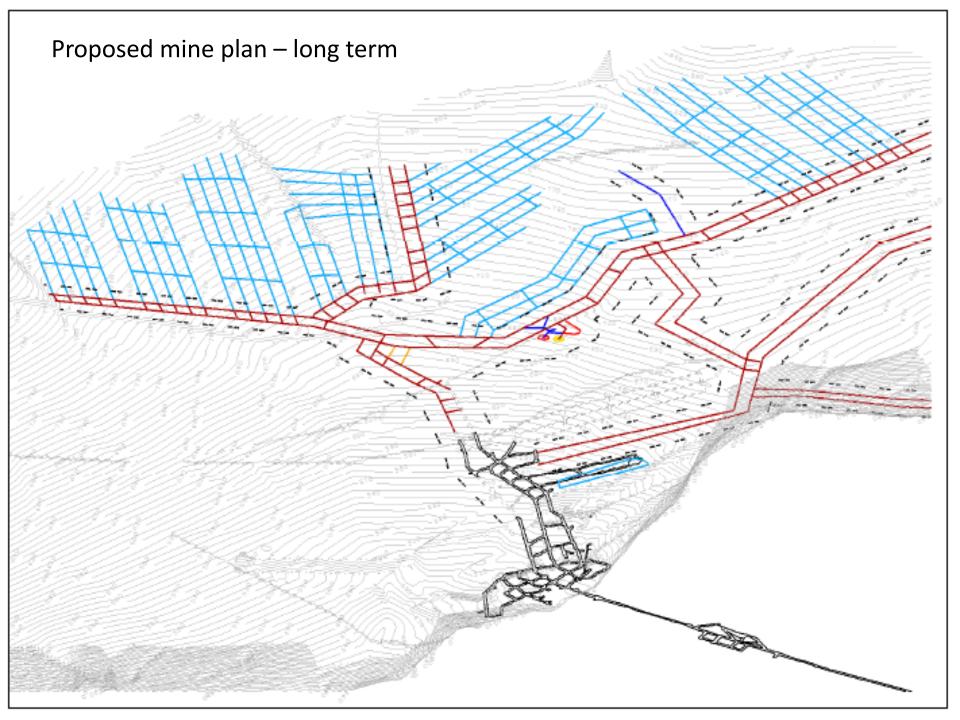


## Pit Bottom in Stone – Slurry Sumps

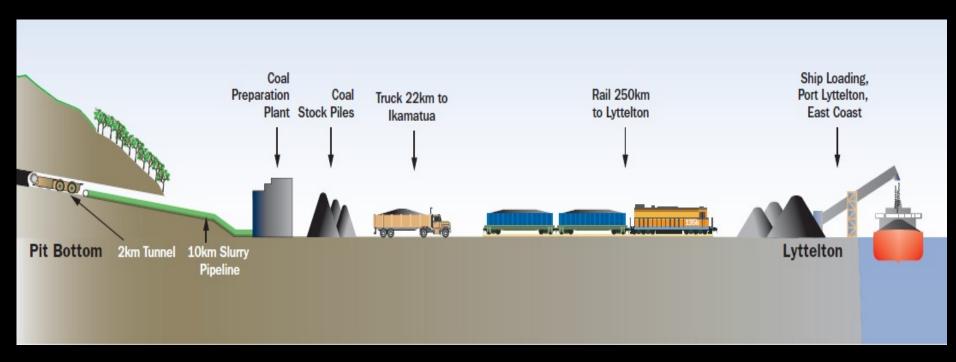


Coal crushed to < 35mm - Slurry 35% – 40 % coal to water





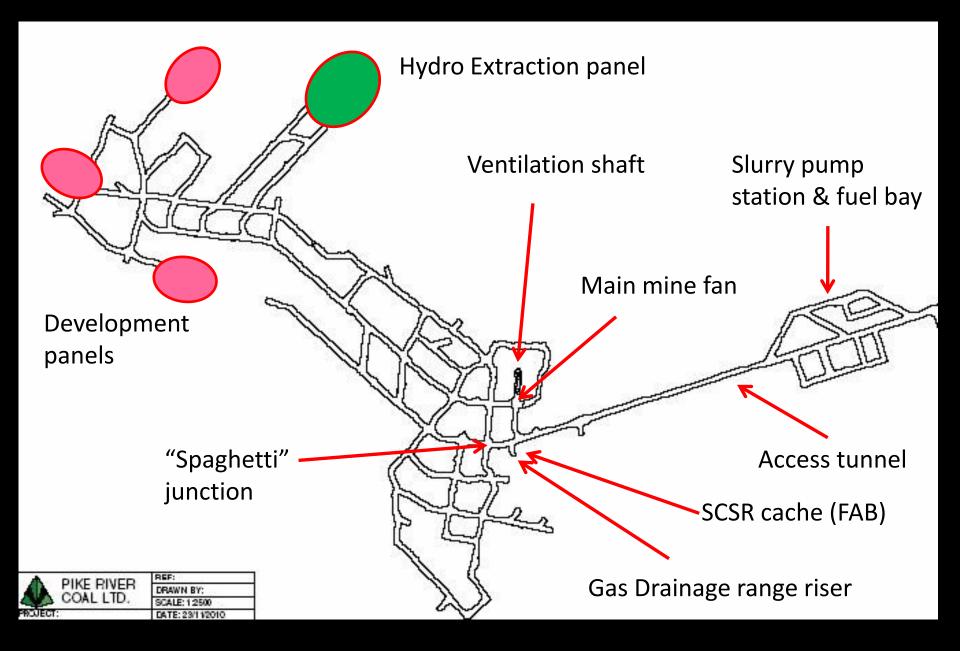
# Pike River's Mining Process and challenge.

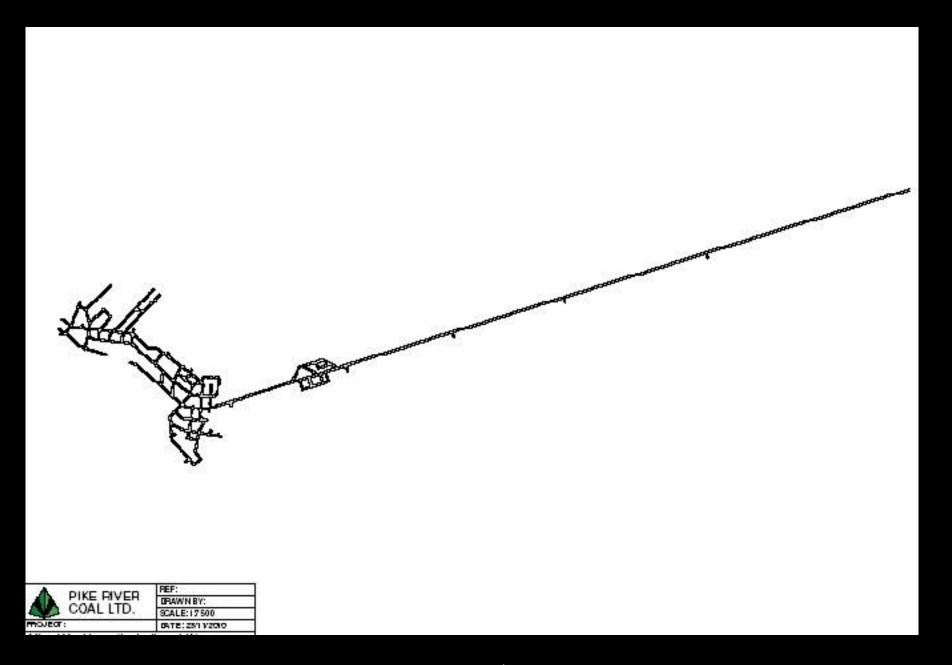


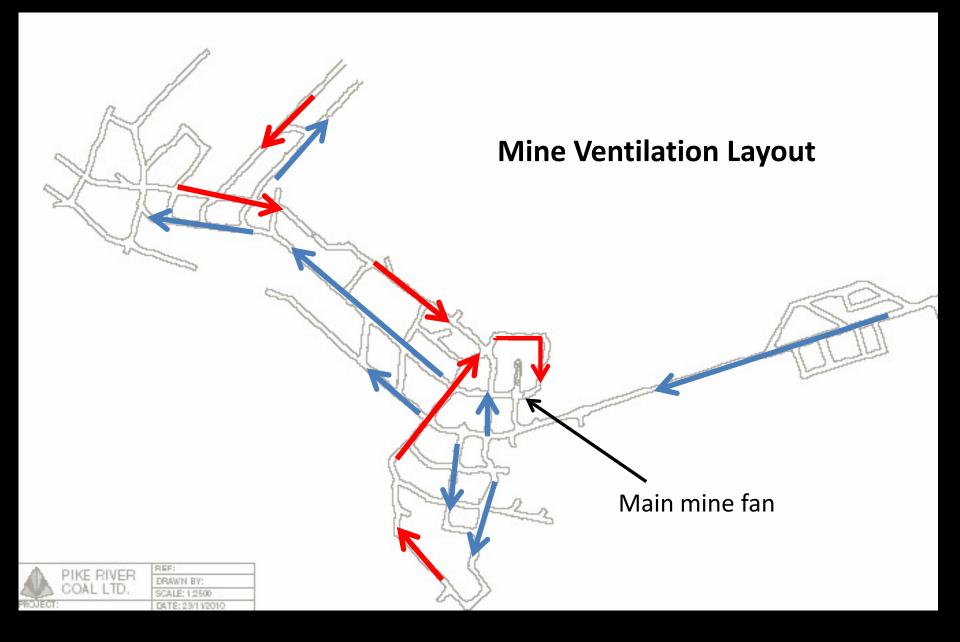
West Coast East Coast

# The incident Nov 2010

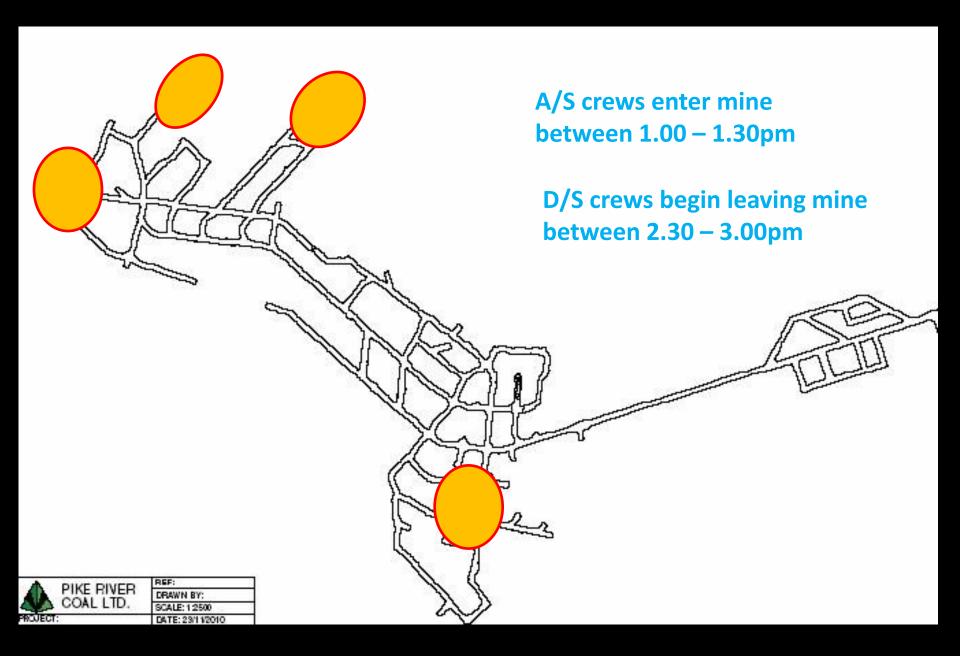
# Day 1 - Friday 19<sup>th</sup> November

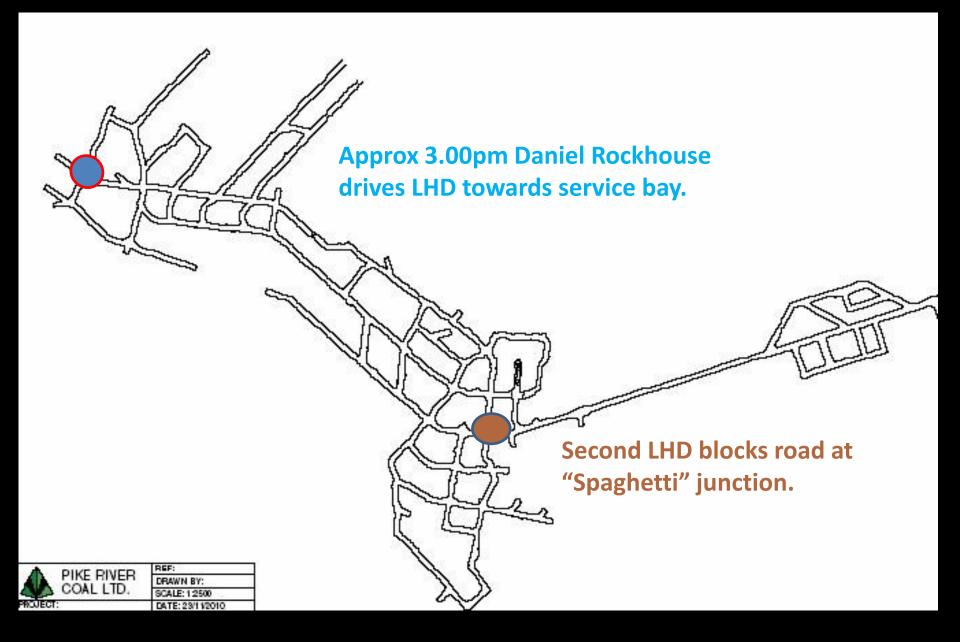






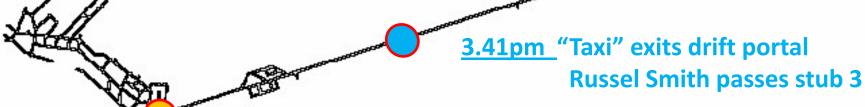
Friday 19<sup>th</sup> November 2010





Approx 3.20pm Russell Smith enters drift in LHD.

Approx 3.30pm "Taxi" picks up some D/S men at "spaghetti" junction.



Approx 3.35pm "spaghetti" junction cleared & Rockhouse drives to service bay

PIKE RIVER COAL LTD.	REF:
	GRAWN BY:
	SCALE:17500
mojecr:	DATE: 23/11/2010
Mine Workings (including drift) RESCUE 1011119 99	



- 3.50pm CRO notices u/g power & communications down. Notifies Mine Manager.
- 4.05pm (approx) Manager walks outside & detects "strong diesel" smell.
- 4.10pm (approx) Rockhouse regains consciouness
- 4.20pm Electrician drives into mine Manager drives up to portal
- 4.33pm (approx) Electrician phones from underground

"I think we have had an explosion"

- 4.35pm CRO notifies Emergency Services (Ambulance)
- 4.36pm Police notified of incident at Pike River Mine.
- 4.40 -4.50pm (approx) Manager :-
  - Checks who is U/G (tag board)
  - Instructs front gate house to "lock down" mine.
  - Advises corporate office of incident.
- 4.51pm NZMRS advised of incident at Pike River Mine
- 4.54pm Police leave Greymouth for mine
- 5.06 pm 4 Ambulances & Rescue Helicopter on route to mine



5.10pm Manager inspects ventilation shaft by air.

Observes light smoke & "blast" damage



5.27pm Police establish "Forward Command Post" at mine

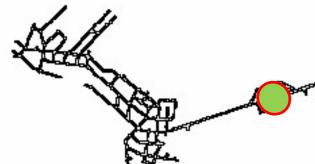
Continuing attempts to determine status of men underground

#### Meanwhile underground

After regaining consciousness Daniel Rockhouse

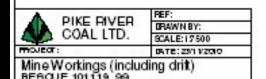
• Calls surface to report explosion. Advised to evacuate.

Begins walking outbye



Locates LHD then Russell Smith unconscious on ground Attempts to fit SCSR then assists Smith to evacuate.

5.15pm – Rockhouse & Smith exit portal

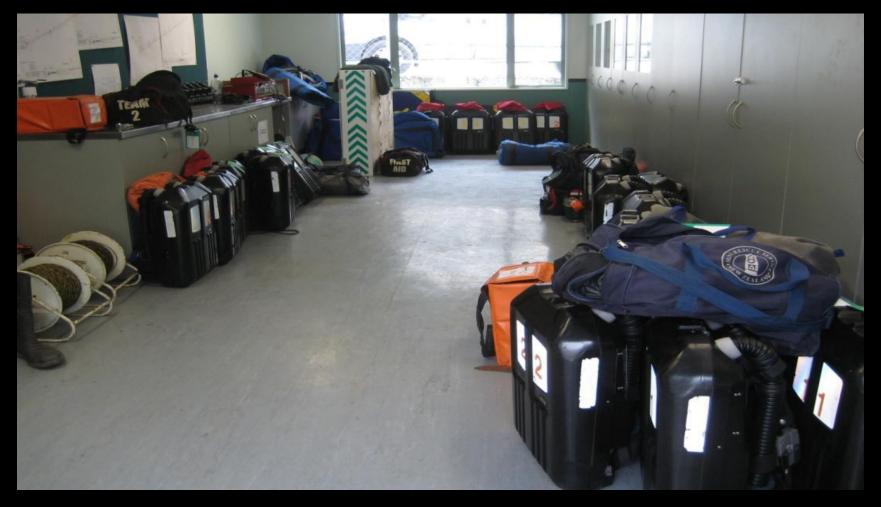


# **Evening of Day 1**

- Incident management team formed.
- Inspections made for damage
- Initial attempts made to determine status of underground environment.
  - ✓ Slight flow of ventilation into mine
  - ✓ CO, CH<sub>4</sub> & CO<sub>2</sub> detected at Upcast shaft
  - ✓ No flow of gas from Methane drainage riser.
- Rockhouse, Smith & electrician medically treated & debriefed.
- Peter Whittal, Pike River Coal CEO travels to mine
- Media briefings released by police.

## Day 2

#### Saturday 20<sup>th</sup> November



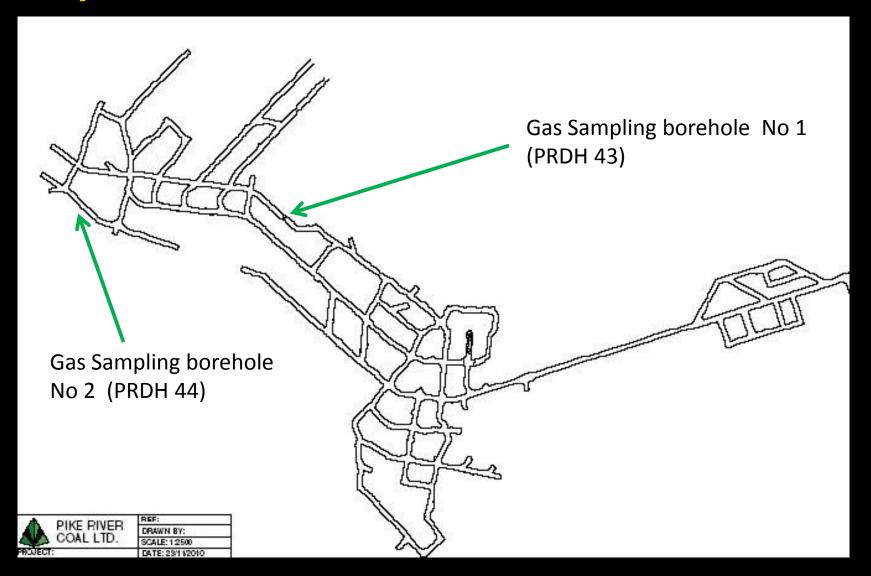
Rescue teams wait for confirmation of ventilation & gas conditions

Concerns over potential for Secondary explosion/s

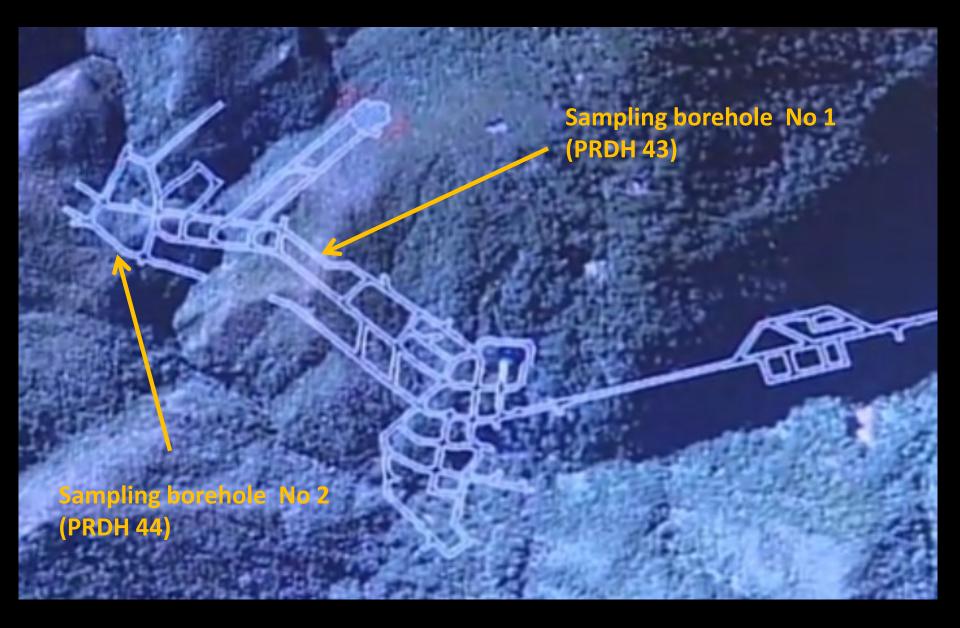
Media interest in incident increases







Drill holes commissioned to further test underground conditions



Topography restricts Drill holes sites



Sampling borehole drill rig



# Drill rig access

- Helicopter only



Location of borehole site



Briefings update families and media

Rescue teams wait to enter mine as limited monitoring shows unstable gas levels underground and possible existence of combustion activity.

Day 4 Monday 22<sup>nd</sup> November



Drilling and ventilation shaft monitoring continues.

### Day 5

#### **Tuesday 23<sup>rd</sup> November**

- 6.00am Converted Military ballistics robot enters mine
- 8.00am Robot breaks down 500m into mine
- Drilling and ventilation shaft monitoring continues.
- Additional I.S. robots sourced from Australia







• 7.45am I.S. Robot arrives from Australia and is dispatched to mine for deployment underground



- Gas monitoring shows fluctuating conditions underground
- Borehole breaks through 95% CH<sub>4</sub>



Robot deployed via main portal (limited success)
Some video footage of drift conditions obtained













Rescue operations halted

Activities move to recovery operations

## Day 7

- Monitoring of underground environment continues
- Drilling of second gas sample borehole continues

IMT review mine stabilisation and recovery options

Day 8 Friday 26<sup>th</sup> November



GAG unit arrives from Australia (QMRS)

Day 8 Friday 26<sup>th</sup> November



GAG unit is assembled and tested















# The dilemma - What now?

Seal mine or Inert (natural or artificial)?

## **IMT's Concerns**

Seal mine?

**Inert Mine?** 

Where?

What -  $N_2$ ?

GAG?

How?

CH<sub>4</sub>?

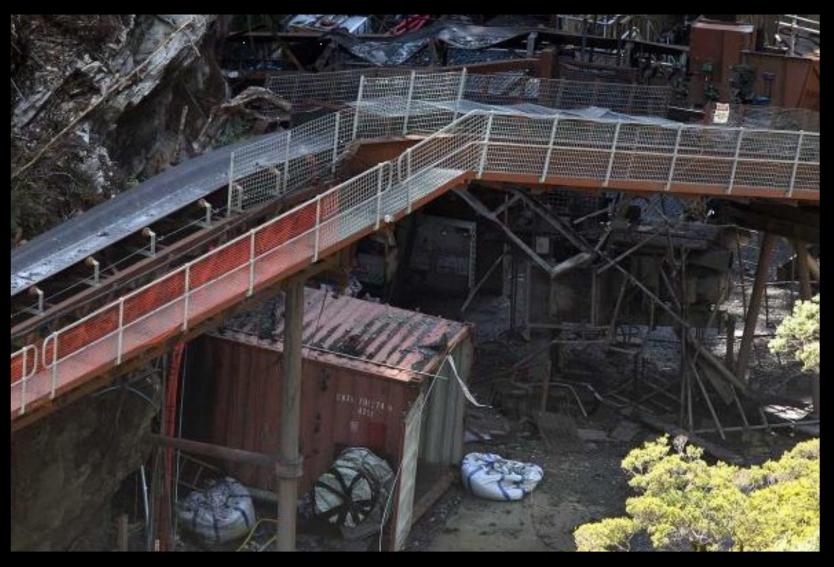
Where?

How?

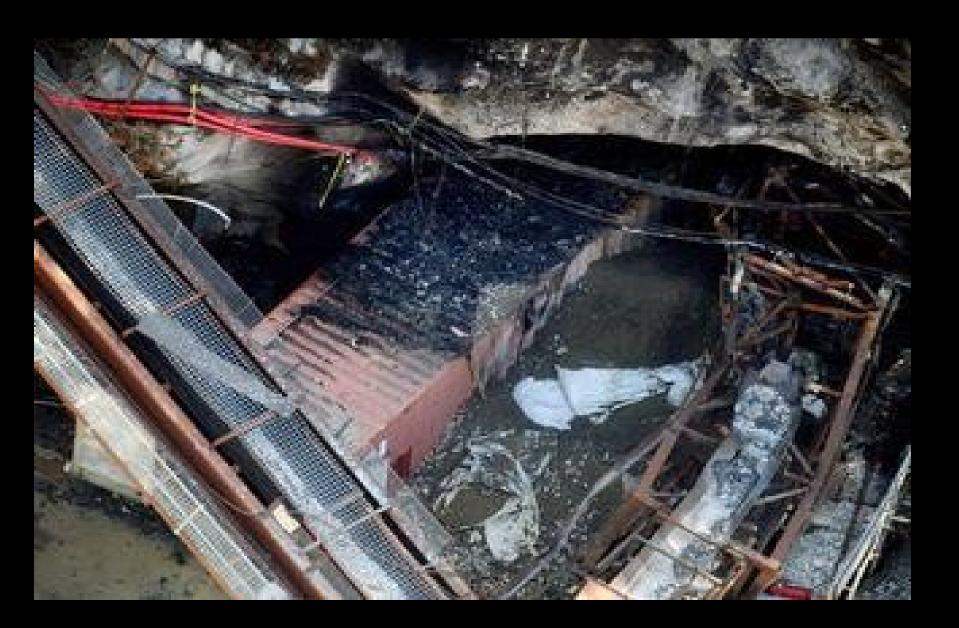


**Day 11** 

Monday 29<sup>th</sup> November



Portal sealing – sea container surrounded by void filling foam



- 6.30am PUR foam around portal seal autoignites.
- Monitoring of mine atmosphere continues
  - unstable & often explosive
  - noticeably less airflow into mine since 4<sup>th</sup> explosion
- Preparation of pad for GAG commences
- Portal sealing work continues later in day
- Dr David Cliff (SIMTARS) joins recovery team onsite



- Portal sealed
- Monitoring of mine atmosphere continues

**Day 13** 

Wednesday 1st December



• 10.00pm Gag unit commences operation

GAG continues to operate to extinguish fire .



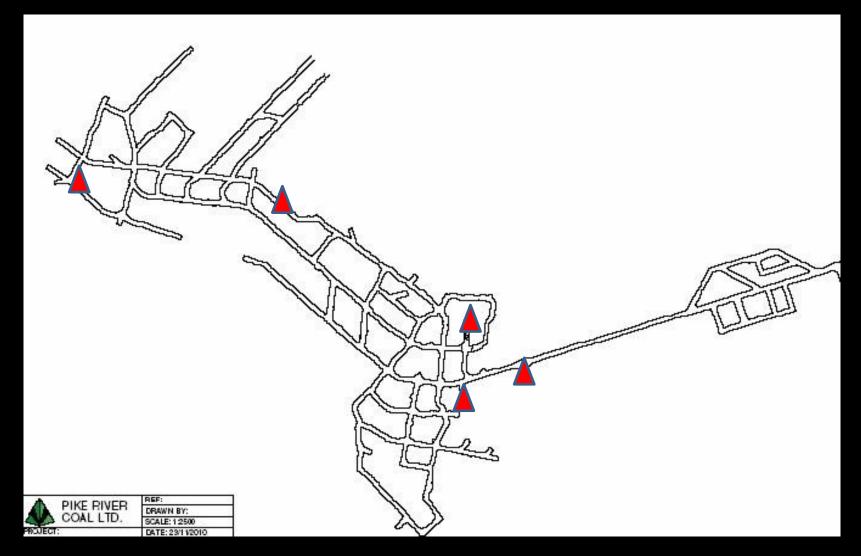
- GAG shutdown for repairs (4 5<sup>th</sup> Dec)
- NZ Fire service establish pumping system to cool surrounds of upcast shaft (> 150°C)
- Police Commissioner commences process of handing back control of mine to Pike River Coal.



Active fire out – Shaft successfully capped

GAG operational for a week

#### Monday 13<sup>th</sup> - Saturday 18<sup>th</sup> December



Monitoring of mine atmosphere continues

Day 31 Sunday 19<sup>th</sup> Dec



Floxal nitrogen unit established to replace GAG (running 18 days)

- GAG and Floxal unit operate in tandem
- Monitoring of mine atmosphere continues
- Gases rise rapidly into explosive range when GAG shut down for maintenance
- Gas levels and temperatures frequently fluctuate
- Plans made to seal around slimline shaft (leakage detected by tracer gases)

## **Day 53**

• Panel of 'experts" review data and brainstorm options



GAG unit shutdown for maintenance

#### Wednesday 12th Jan 2011

- 1.30pm Sealing around "slimline" shaft completed.
- GAG unit remains shutdown
- Panel of 'experts" Risk Assess options

#### **Day 55**

Thursday 13th Jan 2011

- 12.30pm Gas levels in mine stabilise and indicate CH<sub>4</sub> rich inert atmosphere.
- 6.00pm Police Commissioner announces
  - ✓ decision to hand back control of mine to Pike River Coal.
  - ✓ GAG unit will be returned to QMRS

#### Current status – 1<sup>st</sup> July 2011

- Mine in hands of Pike River Coal administrators and up for sale.
- Underground environment is essentially stable. (90% CH<sub>4</sub>)
- Further attempts with robots (unsuccessful)
- Additional boreholes completed (photos taken)
- Mine drift re-entered Mon 27<sup>th</sup> June New substantial seal build just inbye entrance to replace emergency seal at portal mouth
- Inquest and Royal Commission investigations in progress.
- Royal commission Phase 1 -11<sup>th</sup> to 22nd July 2011
  - Phase 2 5<sup>th</sup> to 23<sup>rd</sup> Sept 2011



Image of two SCSR Cache boxes in pit bottom FAB

#### **NZ Royal Commission investigation**

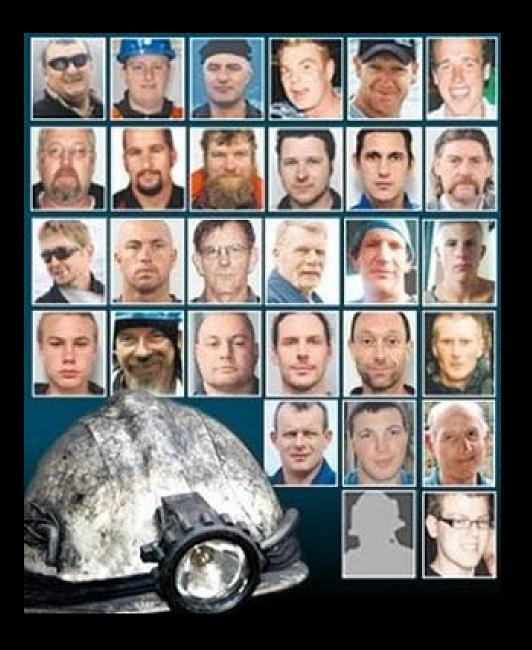
Phase One: Context - The NZ regulatory environment, interaction of mining law and other law in NZ & the resourcing and implementation of mining law.

Phase Two: Search and Rescue - The cause of the loss of life, the search, rescue and recovery operations

Phase Three: What happened at Pike River – The cause of the explosions. Pike River Coal Limited's operational and management practices. Regulatory oversight.

Phase Four: Policy Aspects – comparing NZ & other selected countries mining regulation & practice, their interaction with environmental, conservation and other legal requirements. Resourcing, administration and implementation of, mining law and practice.

# What can the Australian coal industry learn from these events?



# To remember the Pike 29.