AUSTAR COAL MINE PTY LTD
ACN 111 910 822

To: Australian Competition and Consumer Commission
Date: 11 December 2007

Submission in response to Newcastle Port Corporation's applications for interim authorisation A91072 – A91074

PUBLIC VERSION

1 Introduction

1.1 On 16 November 2007 Port Waratah Coal Services Limited (PWCS), Pacific National (NSW) Pty Ltd (PN) and QR Limited (QR) applied for interim authorisation under section 88(1) of the *Trade Practices Act 1974* (TPA) of a proposed system to address the imbalance between the demand for coal loading services at the Port of Newcastle and the capacity of the Hunter Valley coal chain in 2008.

1.2 The PWCS/PN/QR proposed system is known as the Vessel Queue Management System (VQMS).

1.3 On 4 December 2007 Newcastle Port Corporation (NPC) applied for interim authorisation under section 88(1) of the TPA of a proposed system that relates to the same issue as the VQMS. NPC's proposed system is, in all material respects, consistent with the Medium Term Capacity Balancing System (CBS) currently in effect but due to expire on 31 December 2007.

1.4 On 4 December 2007 the Australian Competition and Consumer Commission invited submissions in response to the NPC's application with respect to the CBS.

1.5 Austar Coal Mine Pty Ltd (Austar) operates a deep underground coal mine located near Cessnock in the Hunter Valley. It is approximately 70 kilometres by rail from the Austar mine to the PWCS coal loading facilities at the Port of Newcastle. All of the coal from the Austar mine is carried by rail to the PWCS facilities.

1.6 Austar opposes NPC's proposed CBS.

2 Summary of reasons

2.1 The CBS is a real threat to the viability of Austar's coal mining operations in 2008. Austar's allocation at the PWCS facilities will be far less under either the VQMS or the CBS compared to Austar's allocation under its port contracts in 2008, but Austar will be substantially worse off under the CBS compared to the VQMS.

2.2 The extent to which Austar will be disadvantaged under the CBS compared to the VQMS is explained in the confidential financial information at **Attachment "A"** to these submissions. Austar would not be able to cover its cash flow requirements at the coal mine in 2008 under the CBS.

2.3 Austar would survive under the VQMS. In the absence of the limitation on the coal chain, Austar could produce sufficient coal to fill Austar's allocation under its rail contracts in 2008 (the allocation figure appears in **Attachment "A"**), which would be the ideal outcome for Austar.

2.4 However, total demand in relation to the Hunter Valley coal chain in 2008 will be significantly in excess of the total capacity of the coal chain. Austar's maximum output in accordance with the rail contracts has been and will continue to be reduced in proportion to the limitation on the coal chain.

2.5 Austar supports the VQMS, given that the choice is either the CBS or the VQMS.

2.6 Not only would the CBS be harmful, possibly fatal to Austar, the CBS would also be inimical to:

(a) the welfare of people in the Cessnock local government area;

(b) the Australian public interest generally because of the anti-competitive effect.

2.7 To the extent that Austar could be forced to exit the market under the CBS and prices would increase as a result, it is more likely than not that the higher prices paid by the overseas buyers of Hunter Valley coal would be passed onto Australian consumers in the form of higher priced imports.

2.8 There is a real risk that barriers to entry and vertical integration could increase under the CBS compared to the VQMS. In particular, there is a real chance that the unique Longwall Top Coal Caving (LTCC) technology used by Austar would be lost to the Australian market.

2.9 The submission by Austar's parent company, Yancoal Australia Pty Ltd (Yancoal), which accompanies this submission, addresses the issue of the LTCC technology being lost to the Australian market.

2.10 Yancoal's submission also indicates that if Austar should fail in 2008 as a result of the CBS, the Chinese Government would tend to be discouraged from making further investments in Australia. This would be detrimental to the public interest in the foreseeable future.

3 The CBS/VQMS numbers

3.1 The total capacity of the coal chain (minimum throughput estimate) in 2008 is expected to be 95 million tonnes (Mt). The aggregate port demand nominations (PWCS) in 2008 is likely to be 116 Mt.

3.2 Under the VQMS, each rail provider would be allocated a pro-rata share of the 95 Mt in proportion to the lesser of the port or rail contracts for their respective customers for 2008. The overall aggregate lesser of port or rail contracts is estimated to be 108 Mt. The VQMS formula to determine a coal producer's rail allocation would be (95 ÷ 108) x the producer's allocation under its port contract.

3.3 The application of this formula to Austar's allocations under its rail contracts and port contracts is described in the confidential **Attachment "A"**.

3.4 Austar would have a healthy positive cash flow if there was no limitation on the coal chain, because sales of coal would equate to Austar's tonnage allocation under its port contracts in 2008. The difference between the negative cashflow under the CBS compared to the VQMS described in **Attachment "A"** is financially critical for Austar. The CBS would translate into the lost revenue described in **Attachment "A"**.

4 Austar's coal mine

4.1 Austar's coal mine is located in the Lower Hunter approximately 10 kilometres from Cessnock on Wollombi Road, which is 65 kilometers west of Newcastle and 120 kilometers north of Sydney.

4.2 The mine has worked the same leases under various names since 1916 including Pelton, Ellalong and Southland Collieries. Yancoal purchased the Southland Coal Mine in December 2004 and renamed it Austar Coal Mine. Austar commenced mining operations in April 2005 and introduced the LTCC technology in September 2006.

4.3 Mining of the Greta Seam has occurred in the Cessnock area for many years. The seam, which is typically 4.8 - 6.5m thick, has been mined since 1886. The local community has a strong and proud association with coal mining history and tradition. The LTCC technology enabled the reopening of the Austar Coal Mine. Extraction of coal from the Greta Seam would not be feasible without the new LTCC technology developed by Yancoal in China.

4.4 Austar's development consent permits mining with a production rate of up to 3 Mt of coal per annum from the mine. The development consent also allows for the processing and transport of coal to the Port of Newcastle.

4.5 Coal from the Austar mine is is brought to the surface by an underground conveyor system and transferred to the overland conveyor system to the washery near Pelton. The coal is then carried on Austar's own railway for the first 8 kilometers from the mine and then on 27 kilometers of the South Maitland Railway track to the junction of the Australian Rail Track Corporation's (ARTC's) main Hunter Valley coal rail line. The PWCS facilities are a further 35 kilometers from the junction. Austar is not a member of the PWCS consortium.

4.6 Austar holds a current mining lease and has identified three stages of development as follows:

(a) Stage 1 is the current mining area and includes two longwall panels below the former Aberdare State Forest;

(b) Stage 2, expected to commence in the last quarter of 2008, will include three longwall panels beneath privately held small rural residential properties at Quorrobolong;

(c) Stage 3, expected to commence in 2011, will be an extension of longwall mining to an area east of the existing operations.

4.7 **Attachment "B"** to this submission shows the general locality of the Austar mine, the boundaries of the mining leases and the three stages (**Attachment "B"** is not confidential).

4.8 Stage 2 longwall extraction will use exactly the same method as for Stage 1 utilising the same LTCC equipment. Austar expects to extract the maximum seam height of up to 6.5 metres under Stage 2, and the production rate under Stage 2 would not exceed the current approved 3 Mt of coal per annum.

4.9 Stage 2 would proceed under the VQMS but would be significantly at risk under the CBS.

4.10 The Hunter Valley "coal chain", of which Austar mine is part, comprises the railway infrastructure (principally ARTC), the rolling stock (PN and QR) and the PWCS coal loading facilities. The substantial limitation on getting Hunter Valley coal to export markets is not just the PWCS facilities. The limitation is the whole of the coal chain.

4.11 Whilst there is a strong history of mining in Cessnock, Austar is the last operational mine in the Greta Seam. Austar is the biggest employer in Cessnock with approximately 200 employees and approximately 50 contractors. Approximately 43% of Austar's employees are from the Cessnock local government area.

4.12 In mid-2007, the substantial shortfall in the capacity of the Hunter Valley coal chain meant that Austar was forced to reduce its operations from 7 days per week to 5 days. The under-utilisation of the mine resulting from the shortfall in capacity meant that 56 permanent jobs were lost at the mine in mid-2007.

4.13 Austar expects to continue its current employment and contracting levels in 2008 under the VQMS production level. As the capacity of the coal chain increases in the coming years, employment and contracting levels at the Austar Coal Mine would increase in proportion to Austar's increase in production up to the development consent level (currently 3 Mt).

5 The anti-competitive effect of the CBS

5.1 The antithesis of competition is undue market power, in the sense of the power to raise price and exclude entry. The CBS is likely to be anti-competitive in this sense because it will:

(a) increase market concentration in the Hunter Valley coal mining market if Austar is forced out of the market by the CBS;

(b) increase barriers to entry to the market if the LTCC technology is lost to the market because of the CBS;

(c) consolidate vertical integration in so far as surviving producers able to absorb the negative impact of the CBS are consortium members of PWCS.

5.2 Austar is included among the "small producers" listed on page 39 of NPC's submission dated 3 December 2007 in support of the CBS. There are 4 large producers operating 14 mines shown in the list, and 11 small producers operating 20 mines shown in the list.

5.3 This submission only addresses the effect of the CBS on Austar. There is a real risk that either of the CBS or the VQMS could result in Hunter Valley coal mines being moth-balled or closed. The VQMS is the more palatable choice to Austar. The negative impact on Austar from the CBS is particularised in the confidential financial accounts at **Attachment "A"**

5.4 If Austar is forced out of the market because of the CBS, there is a real risk that market concentration could increase, on the reasonable assumption that the large producers can survive the CBS. The constraint on the large producers' market presently exercised by Austar's existence in the market, would diminish.

5.5 The market price of Hunter Valley coal is likely to increase under either the CBS or the VQMS relative to the ideal position of no limitation on the coal chain. However, the increase more likely than not to be greater under the CBS. Most Hunter Valley coal is exported through the Port of Newcastle. The higher prices paid by the overseas buyers is unlikely to be absorbed by the overseas buyers.

5.6 Rather, the higher prices would be passed onto Australian consumers in the form of higher priced imported final products that rely on the coal as a key ingredient in steel making and as an energy source for their manufacture.

5.7 The price increases to consumers is likely to be in proportion to the increase in market power, probably through lawful oligopolistic coordination. The welfare of Australian consumers would diminish.

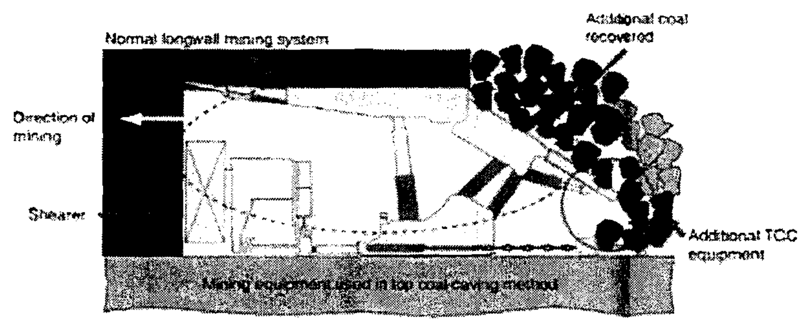
5.8 The most significant negative impact on competition of the CBS would be higher barriers to entry resulting from the opportunity for Australian coal mining industry to use the LTCC technology disappearing.

6 The LTCC technology

6.1 The Austar Coal Mine introduced the LTCC technology as an enhanced form of the conventional retreat longwall system to the Australian coal mining industry in 2006. LTCC technology is ideal in thick seams and enables significantly greater resource recovery in seams such as the Greta Seam mined by Austar, compared to traditional longwall techniques. LTCC was introduced to panels A1 and A2 during Stage 1. Austar's development consent allows the extraction of up to 6.5 metres of coal in panels A1 and A2 using LTCC.

6.2 Extraction results during Stage 1 show that the introduction of LTCC has been very successful. It is proposed to continue the use of LTCC in Stages 2 and 3.

6.3 LTCC is a normal retreat longwall system modified for the extraction of thick coal seams. A second armoured face conveyor (AFC) is towed behind the shields to recover coal that would otherwise fall into the goaf and be lost. The roof supports are of a modified design incorporating a system of hydraulically operated tail-canopies at the rear of the support. These tail pieces work as chutes such that the broken coal in the goaf area can be recovered onto the second AFC.



6.4 This process is allowed to continue until all of the coal is recovered and waste rock appears. At this time, the tail canopies can be raised (or extended) and the "chutes" shut. The rear AFC is then pulled forward to stop recovery of product from the goaf.

6.5 The operation steps in LTCC are generically described as:

(a) shearing coal in front of the AFC;

(b) pulling the support forward and resetting the support to the roof;

(c) opening the tail-canopy of support to allow broken coal to spill onto the rear conveyor;

(d) pulling forward the rear conveyor; and

(e) pushing the front conveyor.

6.6 The recorded subsidence is in line with the predictions and operation of LTCC has proven safe. The system operates the longwall face with a low and stable primary cut (3m) which has provided good face and strata control with safety and efficiency improvements when compared against conventional single slice thick seam longwall systems.

6.7 The LTCC technology is acknowledged as a major improvement for the extraction of the thick Greta Seam coal resource and has received significant interest from major mining houses in possession of the thick seam assets throughout Australia and New Zealand.

6.8 A detailed explanation of the LTCC technology is at **Attachment "C"** to these submissions (**Attachment "C"** is not confidential). If the LTCC technology is not available to mining houses generally, barriers to entry will be elevated because a significant proportion of Australian coal resources would be sterilised.

6.9 Within the region serviced by the Hunter Valley coal chain, there is a coal resource at Gunnedah and another in the upper Hunter Valley that would be suitable for the LTCC technology. Generally, up to 25% of known coal resources in eastern Australia would be impinged if the unique LTCC was unavailable.

6.10 In short, LTCC provides the opportunity to recover more coal than possible using conventional longwall methods. An independent study has shown that up to 25% of coal resources in the eastern States of Australia have been identified as potentially suitable for LTCC extraction. Without its further development and implementation, there will potentially be millions of tonnes of coal resources sterilised.

6.11 The survival of Austar, which showcases the LTCC technology, is essential to the marketing of LTCC to other mining houses by Yancoal. If Austar fails because of the CBS, the perception among mining houses is likely to be that LTCC is a failure. Austar at Cessnock needs to be a success for the marketing of LTCC in Australia to be a success, notwithstanding the inherent merits of LTCC.

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Greig Duncan
General Manager
Austar Coal Mine Pty Ltd

T: 02 4993 7354
F: 02 4993 7326
M: 0400 116 299
E: gduncan@austarcoalmine.com.au

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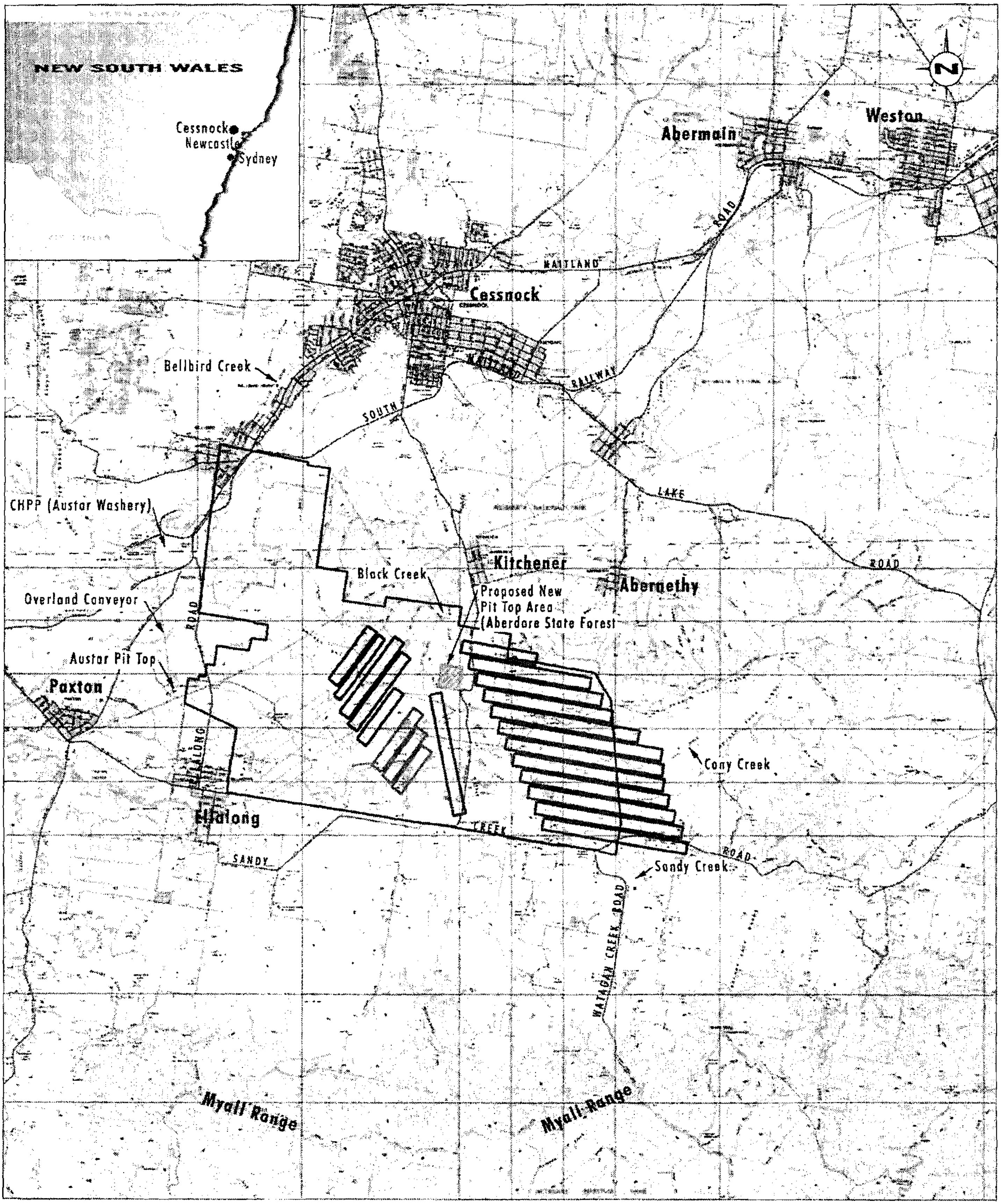
Attachment A - Confidential

Attachment "B" to Austar's Submission dated 11 December 2007 in response to Newcastle Port Corporation's applications for interim authorisation A91072 – A91074

Umwelt



Base Source: LPI NSW 1:25 000 Topographic Maps
Source: Austar Coal Mine

0 1.0 2.0 4km
1:100 000

Legend

- Stage 1 Longwalls Panels
- Stage 2 Longwalls Panels
- Stage 3 Longwalls Panels
- CML2 Boundary

FIGURE 1.1

Locality Plan

Attachment “~~B~~ C” to Austar’s Submission dated 11 December 2007 in response to Newcastle Port Corporation’s applications for interim authorisation A91072 – A91074

LONGWALL USA
LONGWALL TOP COAL CAVING AT AUSTAR COAL MINE

ABSTRACT: Introduced and improved over the last 20 years in the Chinese Coal Fields with more than 90 operating longwalls the Longwall Top Coal Caving (LTCC) method, used for the extraction of thick seams greater than 4.5m, has finally been introduced into the Australian Coal Industry. The method and technology has been introduced in a joint development between the Yankuang Group of China and DBT.

Despite the technical and regulatory challenges associated with the introduction of a brand new technology into the Australian industry the first LTCC longwall successfully commenced production in September 2006. The wall is operating at the Austar Coal Mine which is owned and operated by Yankuang's Australian subsidiary Yancoal Australia. The longwall is extracting a seam thickness of up to 6.5m with a working face height of 2.9m. To date the operation is achieving 88% seam extraction with a recovery of 89% through the washery. There are tremendous opportunities both in Australia and worldwide to mine seams greater than 4.5m thickness using this innovative longwall mining technique.

The LTCC Longwall face equipment was designed by a joint Chinese (Yankuang), Australian (Austar Management) and German (DBT) engineering team. The equipment was manufactured in Germany and supplied by DBT. Technical and Engineering support for the equipment is supplied by DBT Australia.

INTRODUCTION

The Austar Coal Mine is located approximately 8 kilometres from the town of Cessnock in the Hunter Valley region of New South Wales, Australia. The mine is located inland from the city of Newcastle approximately 2.5 hours drive north from Sydney, see Figure 1.

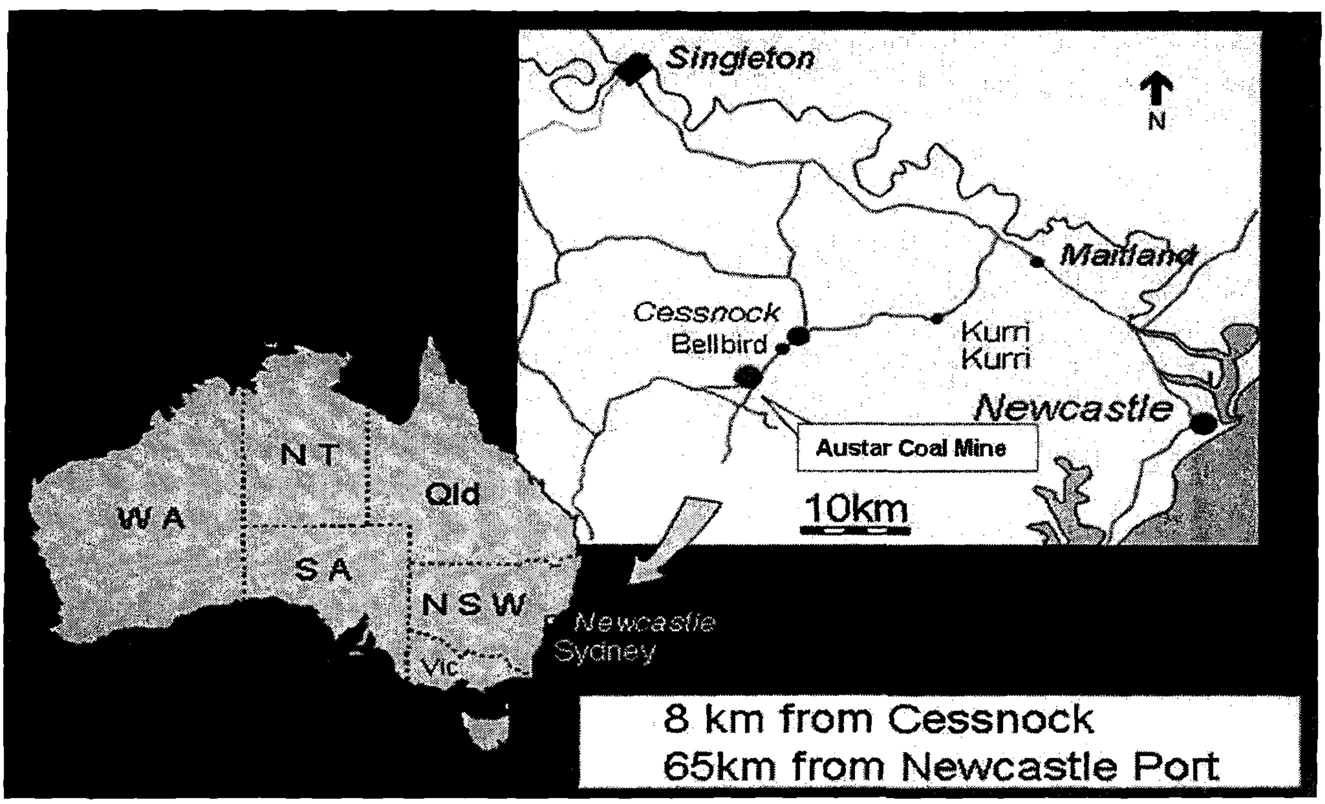


Figure 1: Location of Austar Coal Mine

Austar is owned and operated by Yancoal Australia which is a wholly owned subsidiary of the Yanzhou Coal Mining Company of China. The Yanzhou Coal Mining Company is listed on the Hong Kong Stock Exchange and operates six underground coal mines in the Shandong Province of China. Each of these underground mines is operating LTCC Longwalls and combined produce approximately 40 million tonnes per annum. Yanzhou's Jining No. 3 Mine, at an operating depth of over 600 m produced over 10 million tonnes in 2005, using solely LTCC production techniques. The Yanzhou Coal Mining Company is part of the Yankuang Group.

Figure 2: Jining No. 3 Mine

Commencing LTCC Longwall operations in September 2006, Austar extracts the Greta Coal Seam, which is a high fluidity, low ash and low phosphorous coal. When washed the premium coking product is of high value. The seam is up to 6.5m thick in the current mining area and the Longwall is extracting approximately 88% of the 6.5m seam section, of which 89% is recovered when washed. All coal is exported via the Port of Newcastle.

The LTCC Longwall face equipment was designed by a joint Chinese (Yankuang), Australian (Austar Management) and German (DBT) engineering team with a substantial amount of DBT Australian engineering to provide a total longwall system. The equipment was manufactured in Germany and supplied by DBT. Technical and Engineering support for the equipment is supplied by DBT Australia.

SITE HISTORY

Coal mining in the Greta Seam near Cessnock dates back to the 1880's with the commencement of mining on what is now the Austar Lease's beginning in 1916 as the Pelton Colliery. As the Pelton workings progressed deeper it was recognised that to continue mining in the increasingly difficult conditions that the introduction of longwall mining and increased mechanisation was needed.

In early 1979 a new shaft and drift holed out into three mains heading roadways driven from the Pelton workings. The shaft and drift formed the access to the new Ellalong Colliery which introduced the first longwall into the Greta Seam in 1983 with production commencing in July of that year. A total of 17 longwalls were extracted from the Greta Seam.

During the extraction of the 18th longwall block there was a heating which resulted in the mine being sealed in December 2003 due to the fire. In February 2004 the mine was excavated and recovered. The longwall equipment was destroyed and sealed up as part of the recovery. In the figure below the current workings at Austar are marked in black, the abandoned mines, including the Pelton workings, are marked in green and planned workings are in blue.

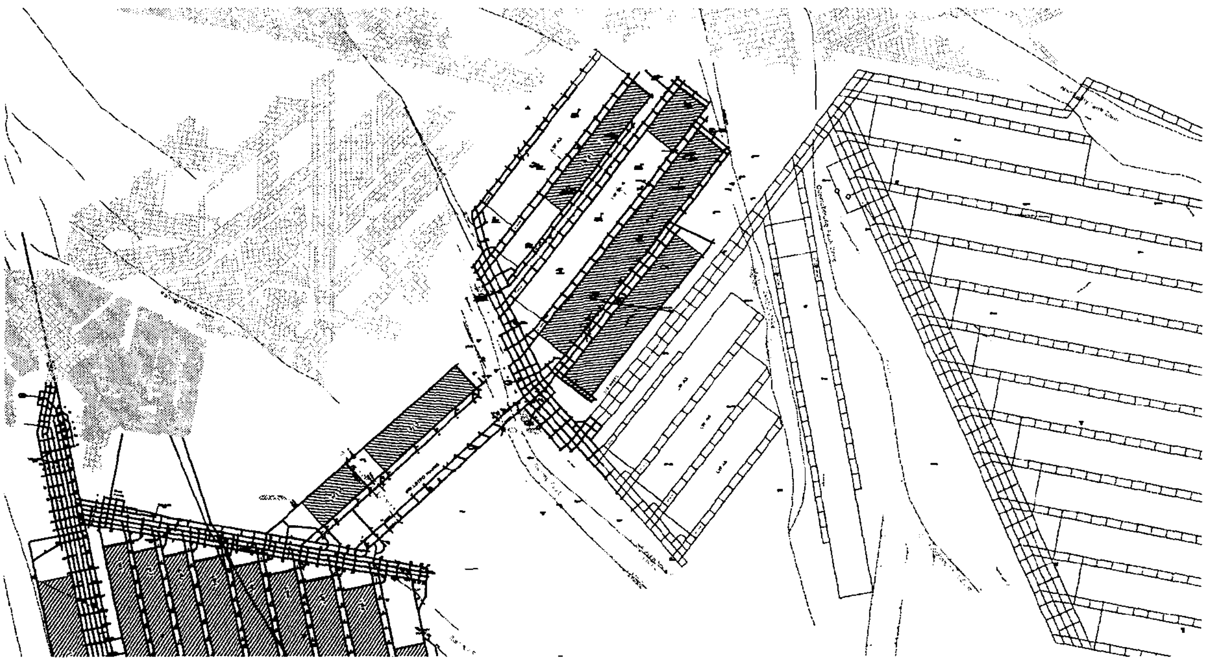


Figure 3: Mine Plan of Austar Working

Yanzhou Coal Mining Company in December 2004 purchased the lease and assets and renamed the mine the Austar Coal Mine. Development roadway driveage at Austar recommenced in June 2005.

Figure 4: Austar Opening Ceremony

LTCC INTRODUCTION TO AUSTRALIA

Initial Study:

In 2001 Yankuang Group commissioned the Commonwealth Scientific and Industrial Research Organisation (CSIRO) Australia's national science agency and the University of New South Wales (UNSW) to carry out a pre-feasibility study into Top Coal Caving in Australian Conditions.

The study that was carried out investigated areas such as;

- Seam Characteristics – thickness, dip and depth
- Stress conditions
- Economic implications of the new system
- Expected operational issues, and
- The overall suitability of Australian coal seams for LTCC Extraction.

The study identified an estimated resource of 8 billion tonnes of coal suitable for LTCC extraction, predominately in the states of New South Wales and Queensland. In the pre-feasibility the Austar lease was identified as having a high to medium potential for a LTCC operation.

As part of the study a risk assessment was carried out on the Application of LTCC in Australian Conditions. The general view of this risk assessment was that there was no significant issue stopping the implementation of the LTCC method in Australia. In fact LTCC was viewed to have many advantages compared to high reach single pass longwalls.

The main points to come out of the risk assessment were;

- The need for a powered roof support for the main gate road way.
- Specifically designed shields to control the caving of the top coal.
- The need for the site selection process to include geotechnical suitability.
- Poor ventilation for rear AFC resulting in an accumulation of dust and gases.
- The Rear AFC drives exposed to gas make from the caving coal with limited ventilation.
- Dust make on the face and the exposure of the workforce.
- Heat due to additional AFC drives on the face.

From this risk assessment the two main developments were the design and construction of the main gate roadway support, mentioned above and the move to two legged supports for better face and caving control.

As well as CSIRO and UNSW DBT Australia was also involved in the pre-feasibility study after they too recognised the potential for a LTCC longwall in Australia. DBT personnel participated in the risk assessment process such that practical solutions to identified risks could be adequately assessed. DBT ultimately developed the new shield and support designs.

The Austar mine is acknowledged in Australia as geotechnically one of the more challenging mining areas. The highly structured and stressed ground and 900 tph constrained coal clearance system was considered by many to be the ideal site for the introduction of the LTCC to the Western World.

The senior management of Yanzhou Coal Mining Company had unquestioned belief in the LTCC system and proceeded with the project with the mind set "that once we demonstrated that it can work at Austar the industry will realise that it will work anywhere".

Regulatory Approval:
The introduction of LTCC into the Australian coal mining industry was a collaborative achievement between Australian, Chinese and German engineers. The equipment was customised to meet the design requirements for operating within the NSW regulatory framework. Both the mining unions and Department of Primary Industries safety divisions were integral in the process and were involved from the early stages of the projects inception.

Risk management included representation from;

- DBT
- Austar
- Yancoal
- The Local Union, and
- Government Mines Inspectors (for scoping sessions)

Due to LTCC being completely new to the Australian coal industry key personnel visited the Chinese operations of the Yanzhou Coal Mining Company to gain first hand familiarity with the LTCC system. The key Austar personnel where;

- Senior Management and Statutory Engineers
- Longwall Coordinator and Longwall Team
- Operators, mechanical tradesmen, electrical tradesmen and Crew Leaders

As well as Austar personnel, Yancoal took the proactive step of inviting the following representatives.

- Government Mines Inspector – Mining
- Government Mines Inspector – Mechanical
- a Union Official and the Local and District Check (Safety) Inspectors.

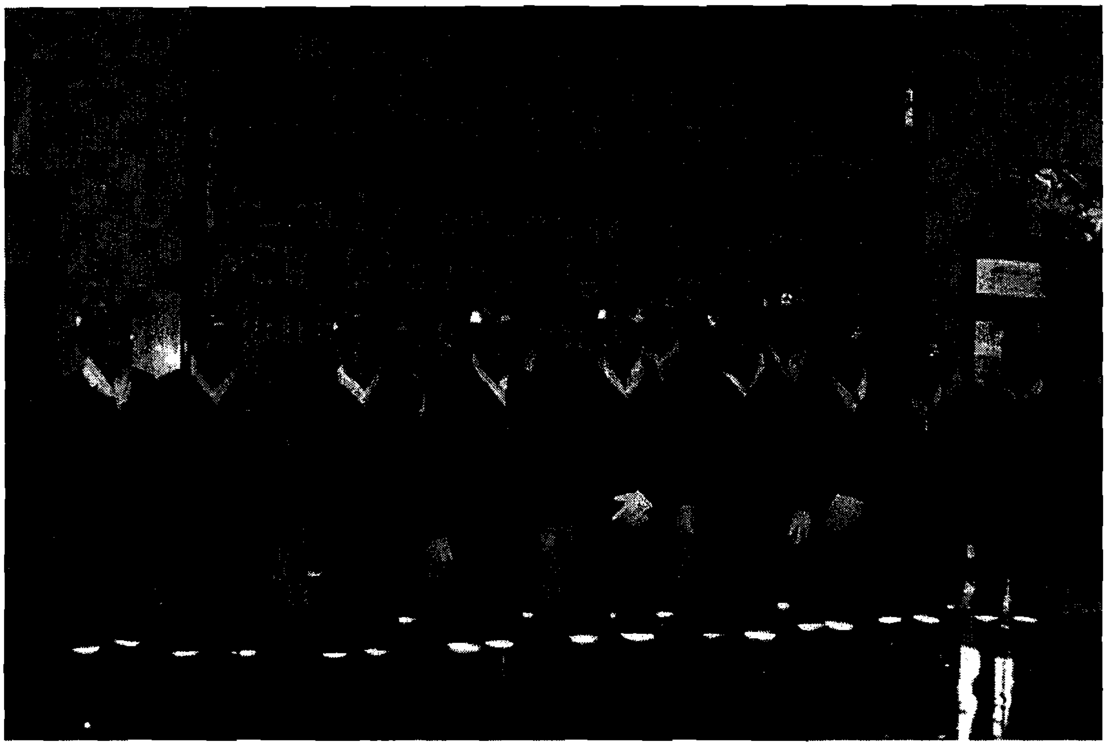


Figure 5: Australian Delegation in China

These visits allowed the people participating in the risk assessments to understand the practicalities of the operating LTCC system and what the potential risks were with the rear AFC system. Separate to these visits there were also visits to China by representatives of DBT.

There was an additional visit by Austar personnel to DBT's facility in Germany where the Austar longwall equipment was fabricated. These compatibility and hosing and piping trips allowed the equipment to be modified to fit the site specific issues at Austar. This included a complete redesign of the valving and fit out of the complex hydraulics on the shields and inclusion of a 420 Bar high pressure set system to better control the expected face conditions.

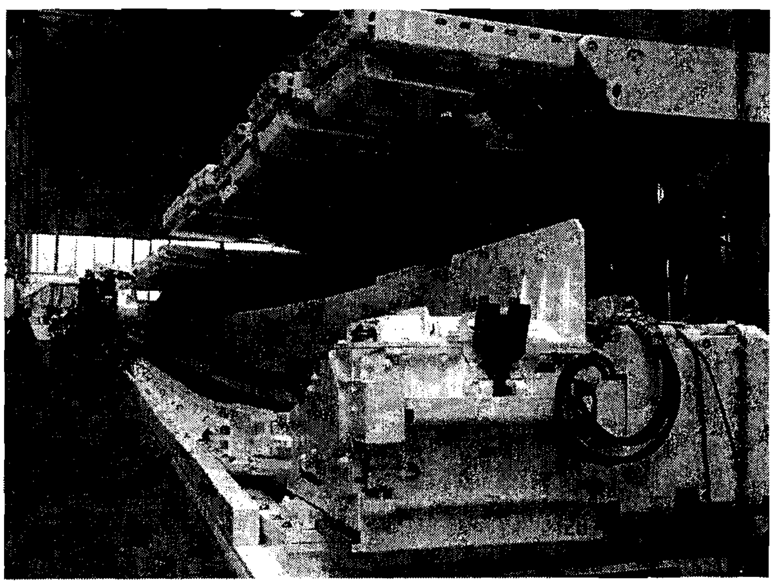


Figure 6: Compatibility Testing in Germany

The risk management process continued with the delivery of the LTCC equipment to DBT in Australia. A 50m mini-build was assembled at the DBT workshop at Hexham near Newcastle, including the Shearer, BSL and Mono-rail. This mini-build allowed for further familiarisation and operational risk assessments to be completed.

From the risk management process Austar was able to develop a complete set of operating and maintenance procedures suitable for the operation of the LTCC longwall. Using these procedures and the mini-build Austar was able to train its operating and maintenance crews prior to the equipment coming on site. DBT Australia was also involved in the training supplying facilities and technical staff.

From the purchase of a distressed site with limited equipment, staff and roadway development, the mine recommenced operations in June 2005 and LTCC extraction in September 2006.

WHAT IS LONGWALL TOP COAL CAVING

Due to the inherent operational problems and high costs associated with the multi slicing longwall method (MSL), and the legislative requirement from the central government of a 93% (minimum) recovery rate, LTCC was introduced to the Chinese coal industry in 1982 (based on the European soutirage methods). The European soutirage methods allowed for extraction of up to approximately 9m thickness with only one set of panel development roadways and infrastructure. From these initial methods the Chinese industry has gone on to develop the LTCC into a distinctly different method with improved efficiency, safety and production rates.

In the simplest description, LTCC is a conventional retreat longwall face with a second armoured face conveyor (AFC) towed behind the shields to recover coal that would otherwise fall into the goaf and be lost, see Figure 2 for layout. The roof supports are of a modified design incorporating a system of hydraulically operated tail-canopies at the rear of the support which can be moved up and down to allow the broken coal in the goaf area to spill onto a second AFC. This process is allowed to continue until all of the coal is recovered and waste rock appears. At this time, the tail canopies can be lowered and "gates" shut, pulling the AFC forward to stop recovery of product from the goaf. The rear AFC pan line is connected to the shields via a chain and hydraulic ram. The chain gives flexibility while the ram drags the pans in behind the shields.

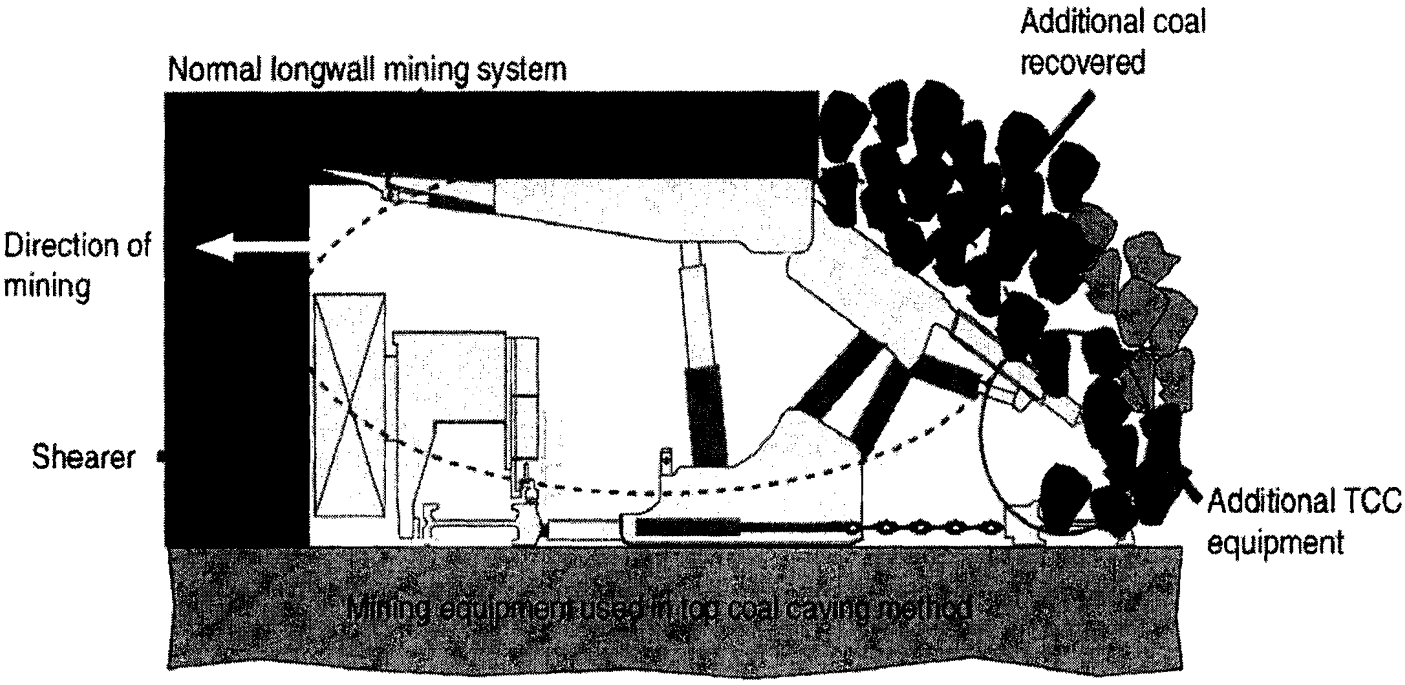


Figure 7: Simplified LTCC Layout

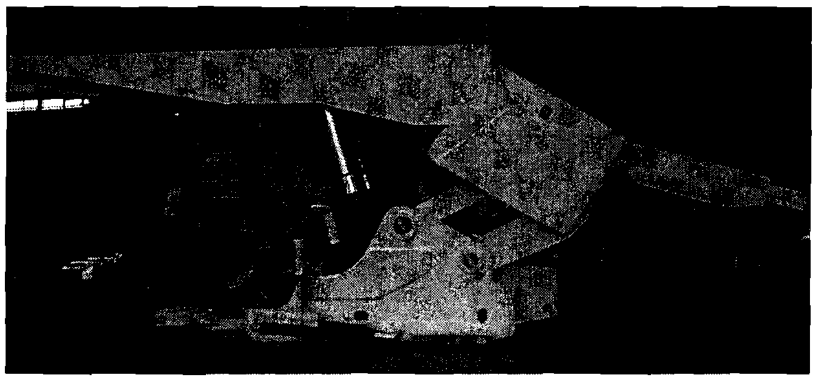


Figure 8: Austar 2 Legged Shield

Figure 9: Rear AFC and Caving Canopies

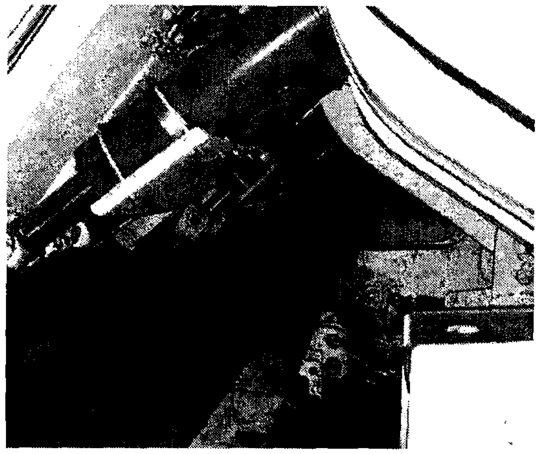



Figure 10: Rear AFC in Operation

To allow the rear AFC to load onto the BSL the BSL is extended back into the goaf area. To facilitate this, the LTCC system uses a purpose designed Main Gate Roadway Support. This support, consisting of five linked shields, extends to the rear of the face and allows for the BSL to be extended for the rear AFC. Although this shield sits in the main gate roadway it is heavily reinforced to protect the BSL and rear of the face from the goaf.

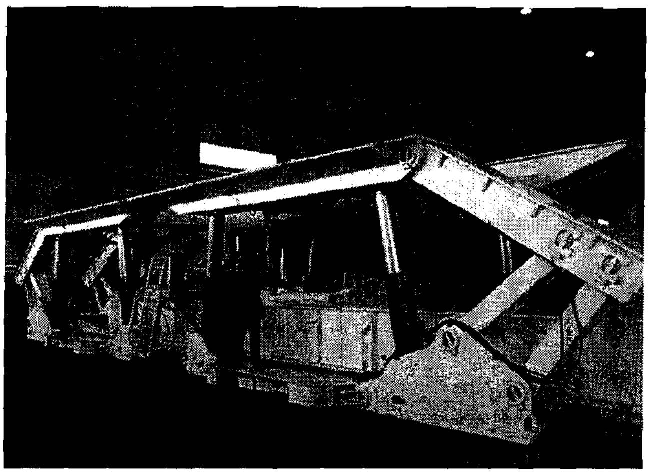
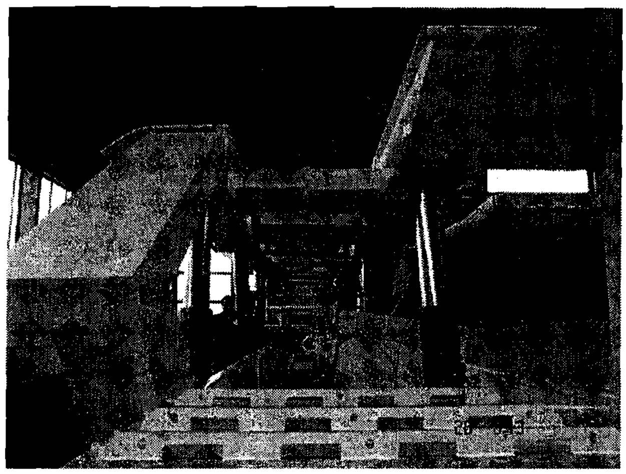



Figure 11: Main Gate Roadway Shield

INSTALLATION

Austar Geological and Geotechnical Environment:

The geology at Austar can be summarised as the Greta Coal Measures overlaid by massive sandstones. The immediate 15-20m of the roof of the Greta Seam comprises the thin Pelton Coal seam (<300mm) and highly variable interbedded siltstones, sandstones, grits and conglomerates. This variation can lead to variable roof strengths. The average UCS of the immediate roof strata varies between 20 – 60 MPa but this increases to 80 – 100MPa within the overlying Sandstones. The immediate floor (0m -1m) of the Greta Seam is a soft mudstone (UCS of 20 MPa) underlain by medium grained sandstones with UCS values of 70 to 80 MPa.

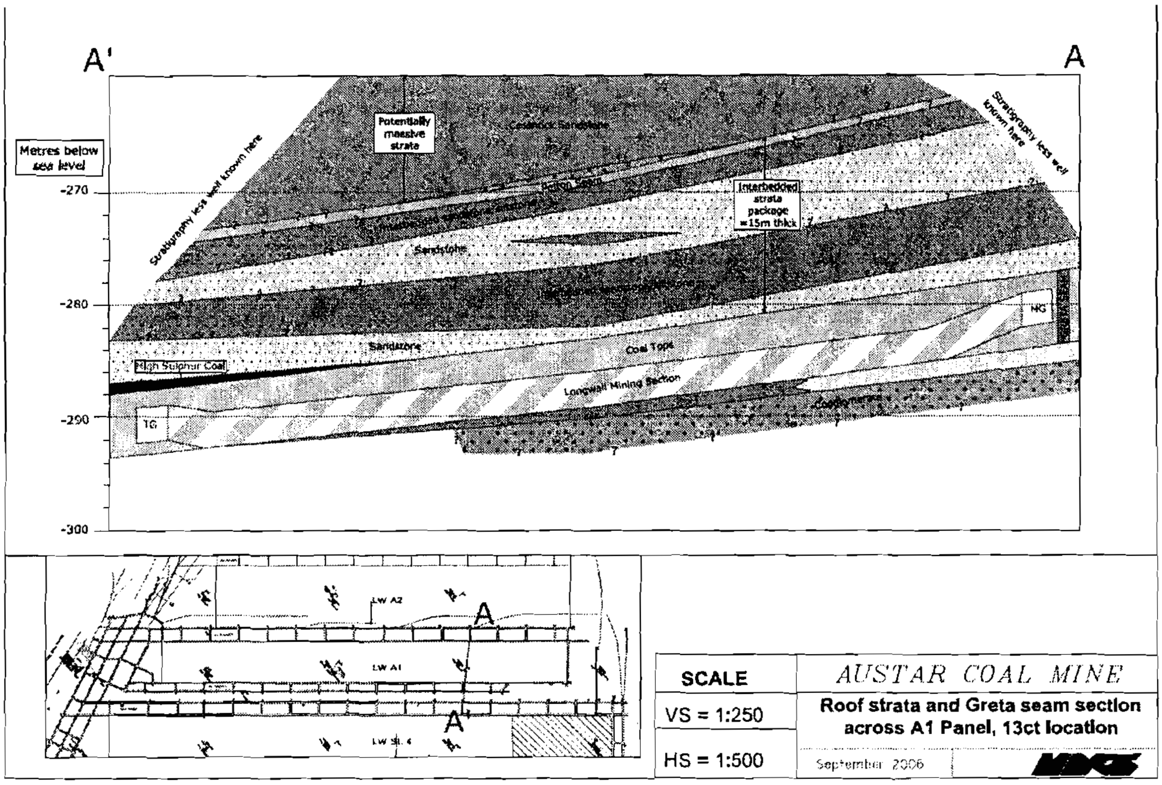


Figure 12: Coal Seam and Immediate Roof Section – A1 Block

The Greta Seam itself is characterised by;

- Low strength (5-8.5MPa)
- Irregular and persistent inseam shear zones
- Zones of highly cleated and jointed coal
- Horizontal stresses averaging 2.5 times the vertical stress at depths of 400 – 650m
- High permeability.
- A number of thin marker bands in the upper part of the seam.

The roof and rib conditions are extremely variable with development targeting the lower marker band as a stable roof horizon. This horizon leaves approximately 1m of coal on the mudstone floor. The high permeability has resulted in high rates of seepage, from the flooded old abandoned workings that are immediately up dip of Austar. See Figure 7, the abandoned workings are marked in green.

Installation Face Roadway:

The rear tail canopies and rear AFC of the LTCC longwall require an installation face of 8.5m wide widening out to 9.5m at the gate ends. This is a metre wider than the installation faces used at Austar prior to the introduction of LTCC. The installation face was considered a high business risk due to the weak and highly structured nature of the coal seam and the high stress environment. Under a previous operator 7.5m wide longwall installation faces had to be abandoned or driven using a strip and install method. Both events resulted in major delays to the operation. To create a serviceable 9.5m wide excavation was a major challenge.

After considering the minimum requirements necessary for successfully installing the longwall the decision was made to drive the installation face to a final width of 8.5m, increased to 9.5m at the gate ends. To safely maintain the roadway for the duration of the installation the initial pass of the face was driven with heavy secondary support including over 450 10m 80t grouted cables, an example of this support pattern is shown below. Despite this heavy support there was guttering at the face see the figure below. In addition 17 extensometers were installed on the first pass. It was the analysis of this monitoring that allowed the face to be widened to its final width. An additional 450 grouted cable bolts were installed in the widened area.

Figure 13: Install Face first pass roof – cable bolts

Figure 14: Install Face first pass roof - guttering

Despite the challenges Austar was able to successfully widen the face to its final designed width and keep it open for the equipment installation.

LTCC Installation:

With the completion of the installation face to the required width the LTCC equipment could be installed onto the face. Due to the need to maintain a solid coal barrier between the new longwall block and the seat of the 2003 fire the first block is only 150m wide. Future blocks are designed at 220m. Due to this reduced width only 79 of the 118 run of face shields supplied by DBT were installed on the face. When the longwall is relocated to the A2 block the remaining equipment will be incorporated into the face.

Initially the longwall shields were to be transported into the face using LHD's and Chariots, however due to width and height restrictions through the old Ellalong workings an alternative method of transport had to be found. Boart Longyear LWC50 shield carriers were hired and work began transporting the shields the approximately 6.5km from the bottom of the Ellalong drift to the A1 install face. These carriers proved so successful and popular with the operators that they will be the carrier of choice in the future. Once on the face the shields were positioned using a Petito Mule.

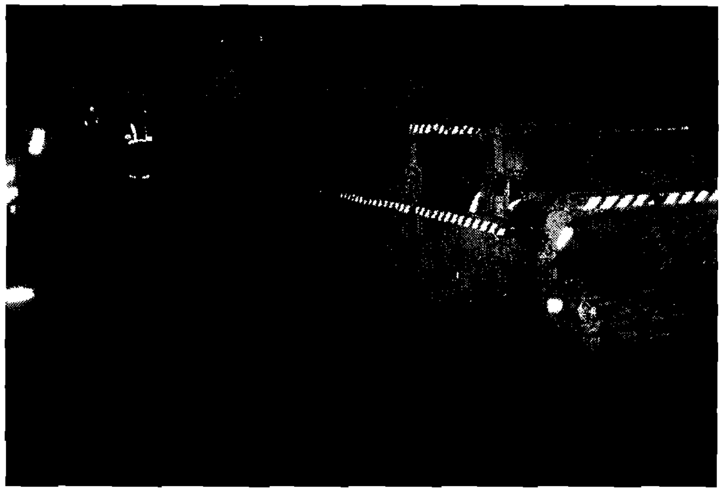


Figure 15: Shield Handling with LWC50 Shield Carrier and Petito Mule

The shields were positioned between the already installed front and rear pan lines. The pans were transported and positioned using an ED10 LHD and a pan picker. Once the shield was in position the two pan lines were connected. The AFC chains were both installed using a winch and rope.

The installation of the face equipment continued with the installation of the six legged gate end supports, the main gate roadway support, BSL and the shearer. Each of these areas required detailed planning from transport down the restricted Ellalong Drift to final commissioning.

The installation of the equipment is so complex at the main gate end, to ensure an optimised timeline it is deemed necessary to install face pans and shields from the tailgate end whilst simultaneously building the main gate arrangements and roadway shield.

It is a credit to the Austar Longwall Team and the longwall crews that despite the complexity and original designs the first ever LTCC face was installed and commissioned without a major incident or delay.

Equipment Summary:
The following is a summary of the equipment that was supplied by DBT as a total longwall system under one contract and installed by Austar.

- 79 Face Shields 1900/3500 (2 legs) LTCC 1040 tonne (of 118 supplied)
- 7 Gate Shields 2200/3900 (6 legs) LTCC 1129 tonne
- 1 Roadway Shield 8 legs 2050/4300 2220 tonne
- All shields fitted with PMCR Electronic Control

- 1 EL2000 Shearer with 2x 500kw ranging arms
- 2x 2.2m D.A drums, 800mm web

Front Conveyor

- PF6/1142-1756mm long end discharge with 2x530kw motors – 86 installed of 118 supplied.
- CST class 45 gearboxes
- 42mmx146mm twin chain

Rear Conveyor

- PF5/1142-1756mm long end discharge with 2x530kw motors – 86 installed of 118 supplied.
- CST class 45 gearboxes
- 42mmx146mm twin chain

BSL

- PF5/1342 with 34mmx126m twin chain, 1x400kw motor, crusher SK11/18 with 1x400kw motor.
- DBT 3m overlap boot end with levelling and side walking

Monorail

- DBT 200m travel system complete with 5 air powered shunting trolleys, total extended length 392m
- Full cable and hose handing system and inbye rigid section for the DCB
- Dump valve, filter station, tool boxes and monorail beam storage.

Pump Station

- 3x Hauhinco 3K200/53 Emulsion pumps, 10,000 litre tank each delivering 3091/min
- 1x Hauhinco 3K150/80 shearer water pump
- Pumps mounted on a DBT crawler track sled.

Electrical system

- 1xAmpcontrol 6.25MVA transformer with DBT tracks
- 1xAmpcontrol 10 outlet face DCB (on monorail)

EQUIPMENT INNOVATIONS

The LTCC for Austar not only was the first new generation top coal caving face but also had a number of Australia first and world first innovations. DBT was assigned a single contract in which it co-ordinated all sub-contractors which included Pump Station and Electrical system. The longwall face shields had 20 valve functions and required DBT's new generation of shield control unit the PMC-R. This was the first installation in Australia and third in the world. The PMC-R due to its increased processor speed functionality and high speed bus is the only control system available to undertake the complex task of a fully automated LTCC face.

Austar was also the site of the first new generation mid to low seam shearer the EL2000. The building blocks for this shearer of automation control AC drives and haulage are well proven. Added to this was DBT's new generation ranging arm. The horizon control of the face at Austar is amongst the most complex operating requirement world wide as both the maingate and tail gate areas are needed to be ramped up and in order to maintain a very stable face the shields were moved across in very close proximity to the cutting drum and flippers extended. Over the last three months of operation automated horizon control has been successfully implemented on the basis of "repeated roof" which allows the shearer operators to remain on the clean air side of the ranging arm. AFC control for LTCC is also paramount. Fast response and feedback on potential overloads is required and Austar was one of the first mines in Australia to use DBT's next generation of CST drive control for PMC-D. With the need for restricting coal flow onto the belt conveyor of around 1000 tonnes per hour it is also important to have feedback from the stage loaders to ensure coal production overload does not occur. Again, this has been successfully implemented.

In summary, the LTCC face at Austar has had the combined innovations of a totally new longwall mining system which required the design of three totally different longwall shields, substantial innovation around the gate end discharge, and probably the world's most advanced level of automation where each of the major equipment segments is effectively interacting with each other to enable effective automation and protection.

LTCC PRODUCTION COMMISSIONING and PRODUCTION

In September 2006 the Australia LTCC face commenced production. The face conditions at Austar are not easy to work, with soft coal and weak floor as mentioned previously. These conditions had to be carefully managed at the commencement of production. Particularly as the supports had to be brought under a lip at the start to achieve the cutting height of 2.9m, from an installation road at 3.2m height in addition to profiling down to the seam floor. This was a difficult 3D profile which was cut with the Shearer in manual as it was beyond the scope of the automation.

The equipment as specified and delivered is capable of outputs in excess of 10Mtpa. Coal clearance constraints of the mine will limit this to 3Mtpa. It is fair to say that if the equipment was purpose specified for the Austar mine, certain components and capacities would be much smaller. As a result the equipment is tighter than it could otherwise be.

Main Gate End:
The figures below give an idea of the operational issues with the main gate end.
Gate end roadway support;

- Restricted access to face due to the width of gate road support.
- Roadway alignment is critical despite limited ability to steer the support.
- Complex nature of the support requires manual control to advance.
- The management of creep is critical due to the minimal clearances.
- Access to the face via a bridge over the exposed BSL

Some important operational requirements at the main gate end shields include;

- The need to cover the AFC drives extends the shields into the roadway.
- Horizon control for the connection between the gate end shields and the roadway support.
- Restricted access at the main gate end due to the size of the drives.
- Roadway horizon and cleanliness for advancing the front AFC.
- Potential clash point between the shields and top of the AFC drives due to the build up of fines under the drives.

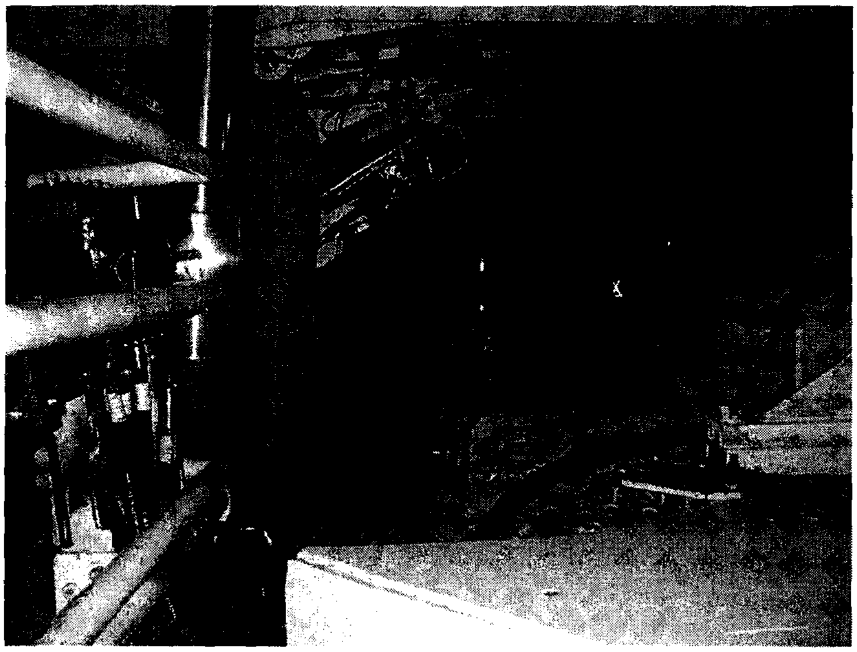


Figure 16: Maingate Gate End Restricted Access

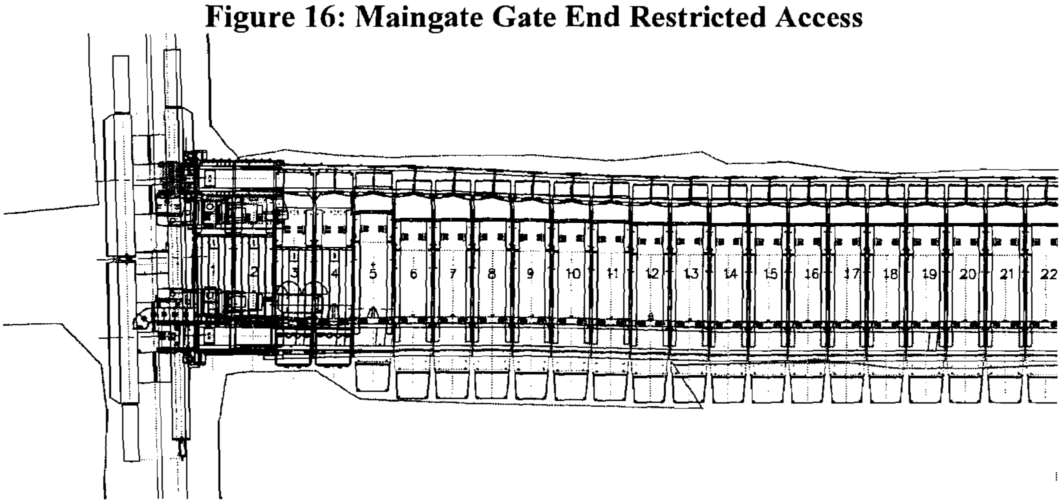


Figure 17: Maingate Gate End Schematic

Tail Gate End:
The issues with the tail gate end are similar to the main gate; see the tail gate figures below.

- The need to cover the AFC drives extends the shields into the roadway.
- Restricted access at the tail gate end due to the size of the drives.
- Horizon control for the advancing of the front AFC drive.
- Potential clash point between the shields and top of the AFC drives due to the build up of fines under the drives.

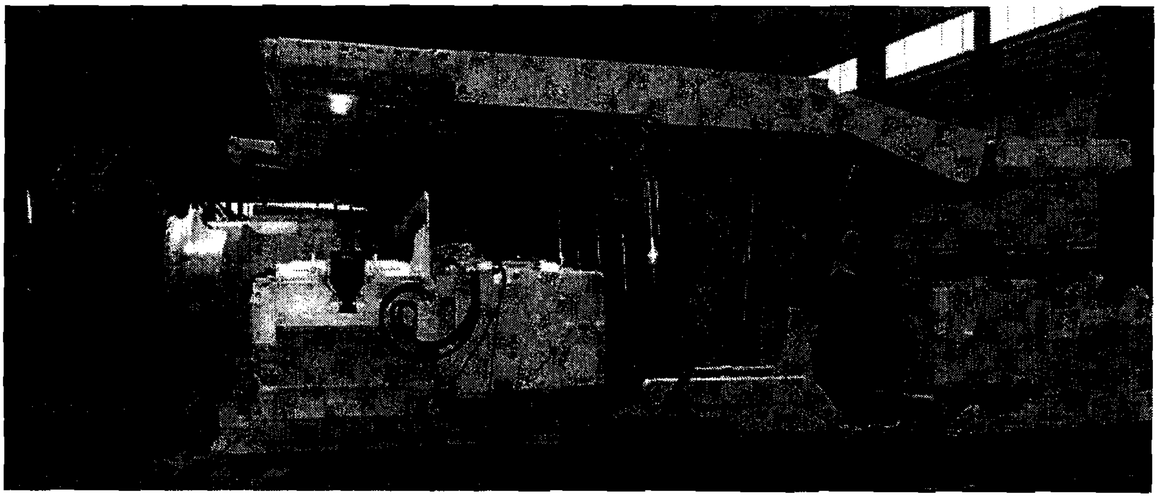


Figure 18: Tailgate Gate End Layout

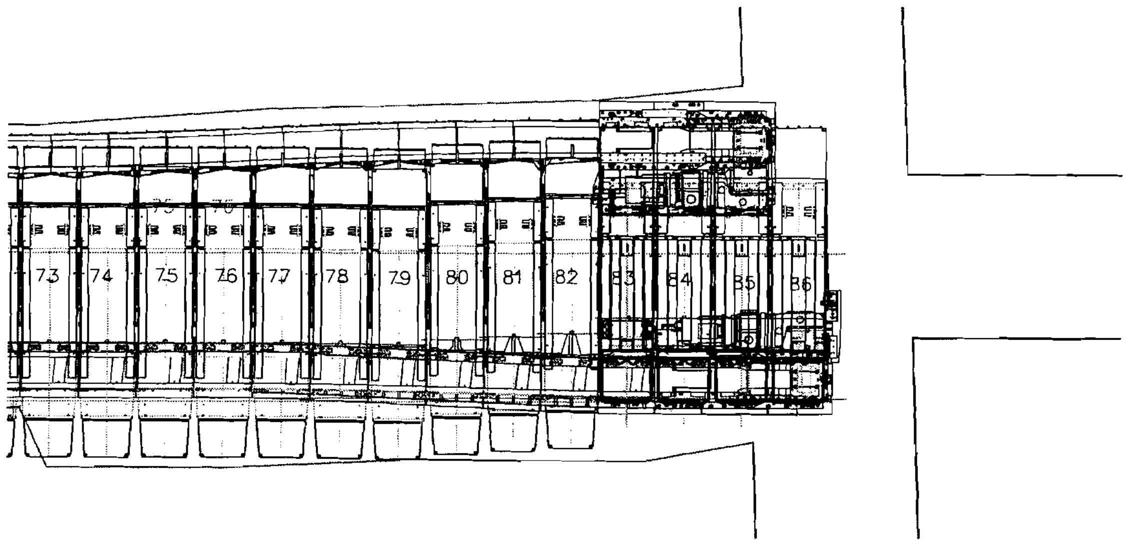


Figure 19: Tailgate Gate End Schematic

Caving:
The caving characteristics have proven favourable to LTCC. The goaf is forming tight to the rear of the shields and 88% of the seam is being recovered. Dilution is readily achieved if not carefully managed and optimising the caving cycle is continuing as a priority. Currently a mix of manual and automated caving is used. Despite the learning curve, Austar is still achieving 89% recovery at the wash plant. The end goal is to fully automate the caving cycle. Currently caving is controlled manually in China.

The high pressure set (420 bar) system has allowed Austar to better manage the face conditions without compromising the break-off line of the top coal. This has been a very successful part of the system which can be supported by the fact that over Christmas 2006, the face stood for 10 days with no deterioration of the top coal or face. Certainly the 1100 tonne capacity 2-leg shields have proven that they can control a soft coal environment extremely well, whereas in the past at the mine, 650 tonne supports were definitely inadequate and face slumping and guttering was regularly experienced.

Horizon:
To maximise the caving tonnes the cutting horizon selected was the floor of the seam to 2.8m. While maximising the tonnes this horizon has meant that the Main and Tailgates have to be graded to fit the gate road horizon which was developed with 1m of coal on the floor. This

coal was left as it was nearly impossible to develop on the stone floor due to water and the soft mudstone in the floor bogging the equipment. The figure below shows a typical face horizon cross section showing the ramp out of the main gate roadway and up into the Tailgate. Maintaining this correct horizon has been an important part of the commissioning process and to date has been managed with some degree of success despite the relatively inexperienced workforce.

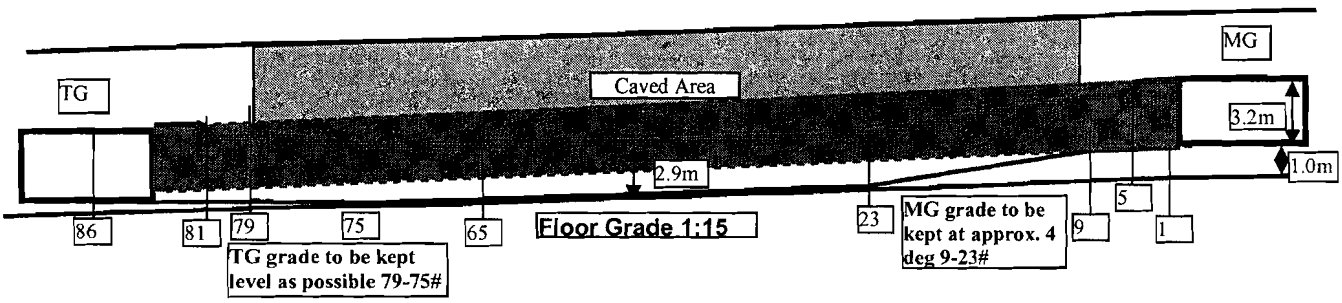


Figure 20: Longwall Face Horizon

Goaf Flushing:

The management of spillage and goaf flushing around the rear AFC drives and the rear of the gate end shields requires careful management. The current arrangement provides poor flushing protection between the 6 legged gate shields. In China the area is controlled using mesh installed over the shields. The same technique is used at Austar utilising pre-cut lengths of steel chain mail mesh. With care the technique is effective at preventing most of the spillage. The drive areas still require regular inspection and cleaning.

Automation:

Face automation with the LTCC system has been successful up to a point. The caving process has been automated and the shearer is handling the complex profile despite availability issues with the horizon control systems.

The automation of the main and tail gate ends is too complex and beyond the capability of current control systems. The length and complexity of advancing the gate end shields require that this is done manually with spotters to ensure the canopies don't become interlocked. A limit of 50% advance had to be placed on the gate support advance to prevent damage and downtime with crossed rear caving shields and side shields. The operating crews received rigorous training in these sequences and they are closely followed and enforced to prevent delay and damage. Advancing the 8 legged main gate roadway shield has similarly proved a complex and ever changing task that is currently considered impossible to automate. The shield is advanced manually to control the alignment and potential clash points.

Services:

The services transition from monorail, via the BSL onto the face proved to be an issue that couldn't be properly identified in the workshop during the compatibility testing and mini-build. Extensive modifications were made to the hose and cable handling system to give better access to the face for the crews and to protect the services from damage. The majority of this work was carried out during the Christmas Maintenance Shutdown and has proven successful. In the figure below you can see the cable and hose management as it transitions from the mono rail and BSL into the main gate roadway support. The services run from the bottom left of the picture.

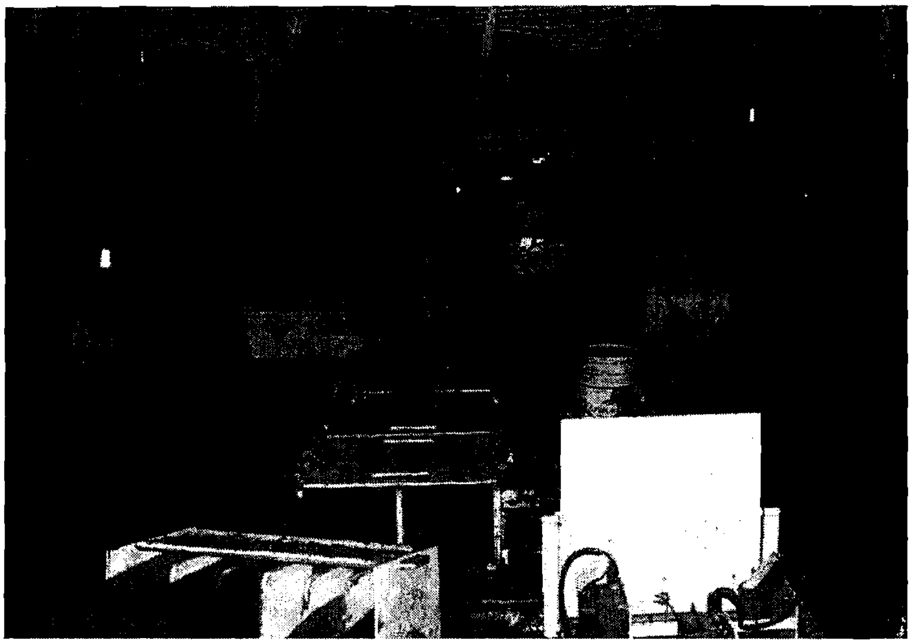


Figure 21: Cable and Hose Management at Main Gate

Roadway Support:
To ensure a smooth commissioning and ramp up into production the main gate and tail gate roadways have been heavily supported with additional grouted cable bolts. From those who were at the mine under previous operators this additional support in the roadways has had a big impact in maintaining roadway integrity.

As shown in Figure 18 the tail gate end shields sit in the centre of the roadway making the installation of standing support in the tail gate roadway is impractical. This potentially leads to the requirement of a tail gate roadway free of standing support. This was thought impossible at Austar under previous operators but to date is being successfully achieved.

Face Conditions:
Face conditions experienced during the mining of the A1 block have been generally good. There have been minor delays due to stress on the face as well as delays due to loss of clearance due to floor heave ahead of the Wall. Compared to the delays suffered during the Southland days these delays have only had a minor impact on the operation. The use of modern two legged supports fitted with flippers has been a big improvement from the Southland wall which combined a number of different shield designs on the one run of face.

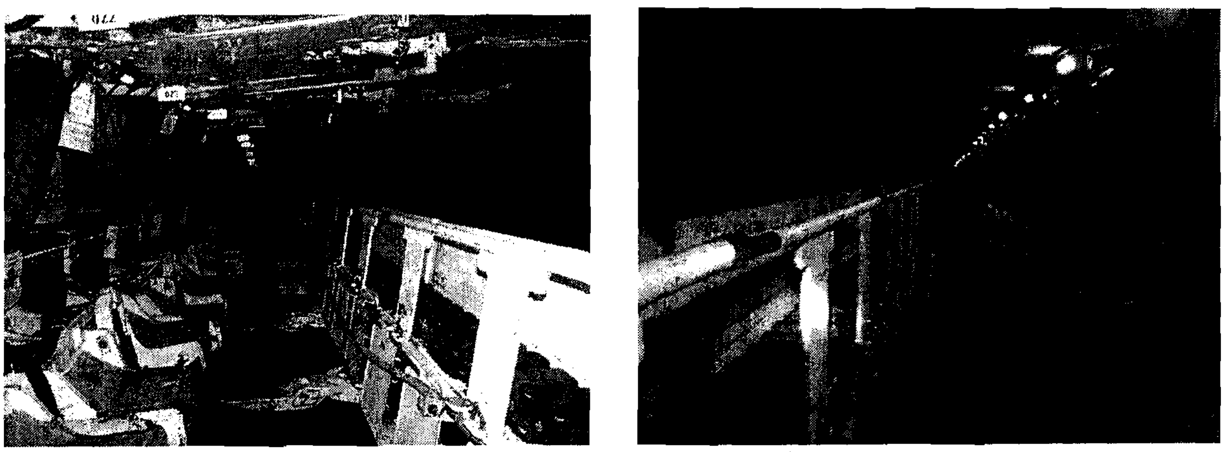


Figure 22: Austar A1 Longwall Face

With exception for around the drives rear AFC access has not proven to be an issue to date. Access to the drives in maintained by close supervision and enforced high face standards of cleanliness around the drives.

By January the Austar LTCC longwall was achieving 99% of budgeted production, with 102% achieved in February. The crews are gaining experience and minor modifications are being made to equipment as needed.

SPONTANEOUS COMBUSTION

Due to the history of the site and the propensity of the Greta Seam to spontaneous combustion there has been a strong focus on monitoring and pre-emptive control at Austar. Some of the controls that have been put in place at the Austar operation include;

- The pro-active inertisation of the goaf and pressure balancing of seals using an on-site 1800m^3/hr nitrogen plant;
- The workforce has been retrained in the detection of signs of spontaneous combustion targeting the early stages of the oxidation process;
- The Environmental Monitoring system of the mine has been upgraded, inclusive of an on-site gas chromatograph and real time monitoring;
- An external consultant experienced, dedicated and focused to monitoring gas trends has been contracted to review and monitor monitoring results;

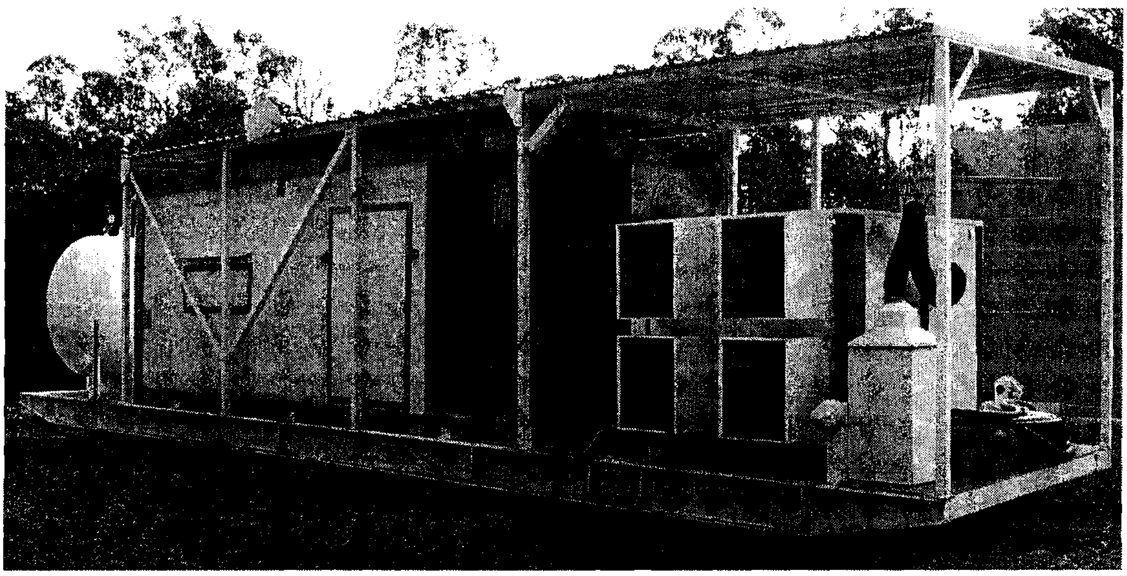


Figure 23: Austar 1800m^3/hr Nitrogen Plant

The mine has introduced some innovations to spontaneous combustion management which are receiving some real focus from operators from other high prone seams in Australia.

In addition to these controls the LTCC has the advantage of recovering the majority of the coal seam leaving a minimum of remanent coal in the goaf to oxidise.

To date the results of the monitoring and inertisation have been promising with gas levels trending well below the management plan trigger points in the newly formed goaf behind the LTCC face and the sealed goaf area.

THE NEXT 12 MONTHS

The first longwall relocation from the A1 to A2 blocks will occur in the third quarter of 2007 and is shaping up to be as big a project as installing the LTCC equipment for the first time. Some of the issues identified with this Australian first are;

- The roadway width necessary to safely and efficiently recover the equipment from the face;
- The level of support necessary to maintain this roadway during the relocation;
- The sequence for recovering the main gate roadway shield;
- The sequence for recovering the six legged gate end shields and the rear drives and the standing roof span required to be held open during recovery.

Austar is taking a very conservative approach to the ground support for the take off roadway with a heavy support pattern planned. In particular the gate end areas will be heavily supported with post grouted cable bolts. To give access to recover the rear AFC drives, chain and pans the gate end shields will need to be recovered. This will open up a roof span of approximately 14-15m adjacent to the goaf edge.

Prior to and after the relocation there will be fine tuning of the automation and cutting cycle to maximise the efficiency of the LTCC system. In both cases it will be the advancing of the gate end areas that will be the area of primary focus.

The conditions in the Tailgate will be a key factor for the success of the next block. With the increased stresses of an adjacent goaf there is expected to be floor heave in the tailgate roadway. This will need to be managed to ensure that the clearance and horizon is to be maintained for the tail gate end shields and AFC drives. To date the most effective control of the horizon has been a paint mark that is maintained on the rib at top of drum height. Additional controls such as trenching and cabling the floor are being investigated.

The longwall will require re-handing due to the layout of the blocks in the future mining areas. While the next two blocks do not require the wall to be re-handed this will be a major undertaking and planning is already underway.

Away from the longwall Austar is committed to a program of improvements to the existing coal clearance system, which in some areas dates back to the original Ellalong installations. These upgrades will allow the LTCC system to achieve even higher productivity.

THE FUTURE

The increase to the ratio of longwall extraction to roadway development guarantees the long term future of the LTCC at the Austar mine. This being said there is always room for improvement. A number of the long term projects that are currently being investigated include;

- The redesign of the six legged gate end special to a four legged shield to improve operational efficiency, allow for automation and better control flushing.
- The redesign of the Rear AFC drives to reduce their overall size. This will reduce the overall length of the gate end shield canopies.

- The redesign of the Rear AFC to BSL transfer, once again to minimise the overall length of the canopies required.
- Investigate changing the development horizon to the base of the seam to remove the gate end ramps and associated horizon control issues.
- The widening of the main gate roadway to 5.2m from the current width of 5m to improve the clearances for the gate end and roadway shield. This is planned for Austar block A3 with the mobilisation of a Joy wide head continuous miner which will cut a 5.2m roadway.

The modifications and improvements on the LTCC equipment are being carried out in close partnership between DBT, Austar and Yancoal and will no doubt result in an industry leading extraction system capable of maximising the value of the operation.

CONCLUSION

With a proof of concept and the capacity for improved efficiency the LTCC system at Austar is set to take the mine into its centenary with industry leading innovation and technology.

With Yankuang Group of China and DBT Engineering working together there is little doubt that the LTCC system will become as important to the Australian and world coal industry as it is in China.

Authors

Greig Duncan – General Manager, Austar Coal Mine

Tim Clarke – Systems Project Manager. Longwall Capital Equipment, DBT Australia

Glenn Sobey – Mining Engineer, Austar Coal Mine