Coal mining in eastern Australia

Hunter Valley
Shipping 260 million tonnes in 2008, Australia is the world’s largest exporter of black coal. Roughly one third comes from coalfields in New South Wales, two thirds from those in Queensland. Pit Viper 275 rigs are contributing to production from the Hunter Valley in New South Wales and the Bowen Basin in Queensland.

Multi-seam, multi-pit mining
Coal production and export is a very serious business in the Hunter Valley, New South Wales. Normally one train passes through Muswellbrook carrying coals to Newcastle, Australia’s major coal shipping port in 2008, every 20 minutes, said Robert (Rob) Swan. Muswellbrook (pronounced Musselbrook) lies pretty central to the main Hunter Valley coal mines; it is where the Atlas Copco office and service facilities for the area are located and where Rob, who is the Regional Manager – Eastern New South Wales, is based. It is also quite close to the Hunter Valley Operations (HVO) “which has proved very convenient for us”, said Dale Radnidge, the HVO Maintenance Supervisor, whom we met at an office complex known as Cheshunt Bathhouse located in the southern section of the HVO.

Located 24 km northwest of Singleton, the Hunter Valley Operations, are 100% owned by Coal & Allied Industries Ltd, which in turn is managed by Rio Tinto Coal Australia. Rio Tinto describes the Operations as a multi-seam, multi-pit open cut mining operation. HVO comprizes: part of the Howick mine, now known as the West Pit, which started operating in 1968; the Hunter Valley No. 1 mine, where production began in 1979, and the Lemington mine, which commenced coal- ing in 1971. Coal & Allied merged the Howick and Hunter Valley mines in 2000 to create Hunter Valley Operations and included Lemington when it was acquired in 2001. The company will approximately produce between 10.5 and 13.5 Mt/y.

In addition to the Hunter Valley Operations, the Coal & Allied portfolio includes the quite new Bengalla strip mine 4 km west of Muswellbrook and the integrated Mount Thorley Warkworth open cut mines 15 km southwest of Singleton.

Purchase factors
Dale Radnidge explained that there had been various reasons why Coal & Allied (C&A) wanted to buy the Pit Viper 275. For one thing, it would be fitted with the Cummins QSK 19 Tier 2 compliant engine that will meet the relevant Australian environmental impact regulations for some time to come. C&A had good previous experience with the Pit Viper’s predecessor rig, the DM-M2, which was bought in 1995. This has always been a very cost effective machine for the company, with very good life cycle costs – despite the fact that the rig has had to operate for periods in ambient temperatures of over 50° C.

Dale had also had positive feedback from Pit Viper owners concerning the steps taken by Atlas Copco Drilling Solutions to improve features that had been weak points on the older rigs. At the crunch, Atlas Copco quoted a competitive purchase price and the component life cycle costs were acceptable.

Atlas Copco also offered to provide a maintenance technician for 12 months; previously an Ingersoll-Rand Drilling Solutions rig owner himself, this technician has also helped the Atlas Copco team at Muswellbrook to identify maintenance issues.

Regulatory issues
However, life is not too simple for equipment purchasers in Australia, especially in New South Wales where the government guidelines on equipment specifications, primarily designed for machinery operating in coal mines, are the most stringent in Australia. Rio Tinto Coal Australia management also has very strict rules covering equipment specifications and it was necessary to...
have the standard version of the PV-275 modified in a number of respects. Dale Radnidge, the maintenance electrician and maintenance fitters at HVO were involved and so was the unit’s production trainer.

The order was placed late in 2007, not too long after the AIMEX mining equipment show in Sydney, and Atlas Copco was able to deliver the PV-275 that had been displayed – in yellow and gray livery – to the Muswellbrook workshop.

C&A also ordered a new Atlas Copco DML rig that required rather more modification than the Pit Viper. Mr Radnidge explained that a major aim of purchasing these two rigs was to start to create a unified fleet of different size drills with a common cabin design so that each operator can easily switch from one model to another when necessary. The DML rig has replaced an existing competitor machine, whilst another elderly competitor machine had been put on stand-by when the PV-275 started work.

Modifications

The HVO maintenance team were able to inspect the Pit Viper at the Atlas Copco workshop. They could therefore make recommendations as to the changes to be made in addition to those modifications necessary for regulatory reasons. These additional alterations were intended to make it easier to maintain the PV-275.

Meeting NSW electrical equipment requirements necessitated taking out the whole electrical system and installing a different one. Some of the hydraulic system components also had to be changed.

Operation

The mines presently use a walk meter and laser depth indicator in conjunction with mine survey data for drill positioning as the hardware needed to use the GPS system on the PV-275 is not in place yet. The DML has the Aquila system fitted for use with HVO’s Modular Mining Dispatch fleet management system. Dispatch is also being used to monitor the availabilities being achieved by the two new Atlas Copco drilling rigs. At the time of the visit, the Pit Viper was being used with five rods to drill 54 m holes in overburden for blasting and stripping by either dragline or shovel. However, the drilling requirements range from 10 – 60 m depth although the bulk of the benches are drilled with 30 – 40 m vertical holes. Hole size is 7⅞ in for coal and partings and 10⅝ in for overburden. Pre-split holes are drilled at either 10 m or 80 m spacing, in both cases at a 15° angle. Approximately 20 – 25% of drilling time is spent on the pre-splits. All nine drilling rigs working at HVO use Secoroc tools provided through a separate supply and service contract that has been in force for six years.

HVO has two Bucyrus International draglines (1 x 1370, 1 x 1570), six P&H electric shovels and a Terex-O&K RH70 hydraulic excavator. As well as the Atlas Copco drilling rigs there are six older ones from other manufacturers. Mr Radnidge explained that this mixed fleet was built up as a result of the merging of the mines that are now part of the Hunter Valley Operations. C&A has been using the maintenance planning tools in the SAP software portfolio since May 2008.
Summarizing, Dale Radnidge said that not only was the deal which Atlas Copco offered sound but the working relationship that C&A has established with the Atlas Copco team has been good too. C&A is comfortable with the purchase. Indeed, HVO had planned to buy two more rigs, which had been shipped to Australia. However, in the current economic climate this will not be possible during 2009.

Queensland – Drillpro Services

The vast Bowen Basin coal deposits in mid-Queensland extend from the area west of the coastal city of Bowen to south of the Tropic of Capricorn in an area which lies west of Gladstone. The mines are connected by rail lines to five major ship loading Coal Terminals: Abbott Point near Bowen, Hay Point and Dalrymple Bay near Mackay, and the RG Tanna and Barney Point terminals near Gladstone. The Bowen Basin accounts for roughly half the world’s seaborne trade in metallurgical (coking) coal.

Drillpro Services is a drill services and drilling contracting company formed by John Anderson, who had previously worked in a senior position for a major Australian equipment dealer handling machines competing with the Atlas Copco Drilling Solutions range. Having started out selling drill rig parts and doing rig rebuilds, Drillpro bought its first rig for contract drilling in 2001, followed by two more each year after that. For some time the company used the rigs John Anderson had previously sold, but later Drillpro experienced problems with a particular model so Mr Anderson decided to try the equivalent Pit Viper 275. He is now an enthusiastic customer and advocate. Currently the company has two Pit Vipers working at widely separated mines in the Bowen basin. The first to be delivered

C&A intends to create a fleet of different size drills with a common cab design so that each operator can switch easily from one model to another.

The HVO Pit Viper was being used to drill 54 m holes in overburden, using five rods.

Hole sizes are 7 ¾ in for coal and partings, 10 ¾ in for overburden.
Coal Mining in eastern Australia

Blasthole Drilling in open pit mining is at the Curragh operation between Blackwater and Emerald, one of several mines lying close to the Tropic, and the second about 300 km further north at the Coppabella mine.

Curragh North

Operated by Wesfarmers Curragh Pty Ltd, which is wholly owned by Wesfarmers Ltd, the Curragh mine was first developed by an ARCO-led consortium mainly to supply thermal grade coal to the Stanwell power station near Rockhampton in Queensland. Subsequently, metallurgical coal production has grown and the company exports this grade together with surplus thermal coal. Target export tonnage for the Financial Year July 2008 – June 2009 was 7.0 Mt while 4.0 Mt would go to Stanwell.

Production from the original Curragh mine has been supplemented by the development of the Curragh North extension. There are three draglines working at Curragh and two at the extension, where there are also hydraulic excavators loading Caterpillar trucks (793 and 789 models). Both types of coal are mined from this extension: one grade is taken to the coal preparation plant at the original mine by a belt conveyor, the other is hauled by large high-sided truck-trailer units. The plant also washes coal from Yarrabee, some 25 km to the north.

Thiess has the overburden stripping contract at Curragh North, with Drillpro doing the drilling and other specialist firms, including Orica, carrying out the blasting. The overburden is mainly sand and gravel. John Anderson explained that Drillpro Services has worked at Curragh for 11 years. Under the current three-year contract the company operates and maintains two drills that belong to the mining company as well as the one PV-275 and one DM-M3 that Drillpro owns itself. The Pit Viper is working at the Curragh North extension.

From January 5 to January 18, 2009 Drillpro had drilled 51,000 meters, as compared to the mine’s target of 25,000 m/week. This requires a penetration rate of 850 m per 10 hours drilling per shift. However, Curragh was looking to increase the rate to 30,000 m/week. From early August 2008, when the PV-275 started work, up until the time of our visit on January 20, 2009, the rig had drilled 130,000 meters. The rig was still using the original drill rods and had thus far achieved 98% availability, Mr Anderson said. Both this Pit Viper and the one at Coppabella drill 270 mm holes. However, the Curragh machine has a Cummins QSK engine while the Coppabella PV-275 has the Cat C27 option.
Usually Drillpro uses a DM-M3 for drilling 25° pre-split holes and 20° bench holes for cast blasting. Sometimes, commented John, Drillpro gets held up because the pre-split holes are not blasted soon enough. However, the area we visited had a soft wall so pre-split drilling was unnecessary. We watched Phil Smith operating the PV-275. He drilled the A/O hole to 51m and the holes H11 to A11 to between 47 and 50 m.

Phil Smith has 17 years’ experience in exploration drilling followed by 3½ years of production blasthole work, including drilling with the DM45 and the Driltech D75 rigs. He told us that the PV-275 is better than both of them: it is easier to use and has more feel for the drilled rock. The cabin’s perforated blinds were very helpful in the bright Australian sun, eliminating glare but providing sufficient visibility for Phil to move the rig from one hole to the next drilling position. John Anderson remarked that he would like to have a window in the cabin roof to provide a view of the mast, but the design of the FOPS cab makes this impossible. Instead there is a camera system which the operators took some time to get used to, but now find perfectly satisfactory.

**Modifications**

As in New South Wales, though to a slightly lesser extent, some modifications are essential to meet the Queensland government guidelines, explained Don Emery, who is Atlas Copco’s Regional Manager, Mackay. And although John Anderson could not have his roof window, he did get several substantial modifications that he asked for.

The Curragh Pit Viper was shipped into Brisbane, trucked to the Mackay workshops where it was modified, trammed into the Queensland Mining Exhibition held from July 24-27, 2008 and then delivered straight to the mine site. In carrying out the alterations Atlas Copco was considerably assisted by an adjacent firm of boilermakers which could generate the required drawings and do some of the fabrication.

In addition to rewiring according to Queensland standards, the main modifications and additions included: a modified walk-up ladder; one platform in front of the cabin and another to provide high level access to the mast; a Hiab crane, with its own power supply mounted under the cabin, to help with drill tools handling; addition of a Chubb fire suppression system on
a rail around the engine; two lifting hooks; and a microwave and fridge. Several of the standard features were relocated for greater convenience, such as the isolators, which were moved to the back end of the frame to be within reach from level, the Wiggins fast fill unit and the lube drums. Phil Smith was particularly enthusiastic about the Hiab crane which makes his life a good deal easier, he said.

The Coppabella machine was delivered with the lift hooks pre-fitted, an upgraded engine fire suppression system and greasing access for the driveline to the pump. In addition, extra tanks were fitted for dust suppression so that refilling is required after two shifts. As well as a Hiab crane and extra platforms like those on the Curragh Pit Viper, there is an access to the mast and the camera on the mast via the top of the cabin.

**Coppabella**

The overall operation and the mining operation at Coppabella are managed by Macarthur Coal (C & M Management) Pty Ltd – working on behalf of the Coppabella and Moorvale Joint Venture. The Joint Venture comprizes Macarthur Coal Ltd (73.3 % stake held via Coppabella Coal Pty Ltd); CITIC (via CITIC Australia Coppabella Pty Ltd), Marubeni Corp. (via Mapella Pty Ltd), and Sojitz Corp. (via Winview Pty Ltd) each holding a 7 % interest; JFE Shoji Trade Corp. (3.7 % held via KC Resources Pty Ltd); and Nippon Steel Trading Co. Ltd – 2.0 % held via NS Coal Pty Ltd. The coal handling and preparation plant has a capacity in excess of 6 Mt/y raw coal and is operated by the Sedgman Coppabella Joint Venture.

The mining lease was granted on June 1, 1998, overburden removal started in July 1998 and the first coal was mined in October 1998. By April 2007 Coppabella had yielded 40 Mt of run of mine coal. Macarthur Coal’s attributable production in 2008 was 2.57Mt. Proven and probable reserves totalled 67 Mt as at 30 June 2008.

The operation is located adjacent to the Peak Downs Highway, 140 km southwest of Mackay between Nebo and Moranbah. It mainly produces a 9% ash, low volatile PCI grade metallurgical coal that is railed to the Dalrymple Bay Coal Terminal near Mackay. But, in response to market trends, Coppabella has revised its mine plan in order to mine thermal coal and reduce PCI grade output, demand for which has fallen sharply. This also meant that 140 people were laid off in mid-December 2008.

John Anderson’s son Matt joined Drillpro Services in 2003 and now manages four contract sites in the area. Of these Coppabella, where Neal Torresan is the company’s site supervisor, is the largest but the other clients are prestigious – BHP Billiton Mitsubishi Alliance (BMA), whose Poitrel mine is operated by the contractor Leighton; Vale Australia’s Broadlea; and Peabody’s Eaglefield, where the main contractor is Macmahon. Drillpro was also bidding for work at BMA’s South Walker Creek mine, where Thiess is the mining contractor.

At Coppabella, overburden removal is primarily by dragline, coal mining by large excavators loading trucks. Orica is responsible for blasting the holes Drillpro drills under the terms of an 18 month contract. There are presently three producing pits; East, Southern and Johnson. Drillpro has the PV-275 and one other rig operating, one spare machine and one parked unit, all of these being of other make. (When bidding for new contracts having idle machines can help, commented Matt Anderson.)

The Coppabella PV-275 rig drills 20° angle, 18 meter pre-splits and 12-18 meter main bench holes, of which some are angled at 20° but most are vertical. The coal is 13-14 m thick in places at a depth of approximately 37 meters below surface. Jason Camielleri was operating the drill during our visit to the Johnson Pit South.

Routine servicing of the Coppabella machine’s Cat C27 engine is done by Drillpro but any guarantee work is done by the Caterpillar dealer. At the time of our visit the machine had done about 1000 hours.

**Acknowledgements**

Kyran Casteel, a Contributing Editor for Coal Age and Engineering & Mining Journal, visited the New South Wales and Queensland coalfields in January 2009.