

SURVEY TOOLS EXPERIENCE MEETING AT SOUTH BULLI COLLIERY - 27/2/95

OBJECTIVES

To share experiences on the surveying of boreholes, especially rotary holes.

SUMMARY

1. Tools available for surveying rotary tools include the Eastman single shot, Peewee photographic multishot, Champ Electronic multishot. The multishot tools increase productivity by reducing hole survey times by at least half of the time required for single shot surveys. Asahi have introduced a tool with two single shots allowing two surveys during one run of the rods.
2. Peewee used at West Cliff and Tahmoor. Champ used by South Bulli with trials at KCC and Cordeaux.
3. Both tools mainly have been inserted on PVC to around 120m with difficulties. The Peewee is best inserted at the end of the rods and can be pumped down BQ rods. The Champ cannot be pumped down NQ rods.
4. Costs of Peewee and Champ are similar.
5. Peewee considered easier to transport and use mainly because of its smaller size (<1m long vs 3m Champ).
6. Both tools have had teething problems. These are being addressed.
7. There is a need to investigate the accuracy of the tools relative to the length of nonmagnetic rods used and orientation of hole.

1. **ATTENDEES:** Brian Sheldon, Jeff Wood, BHP; Mark Frenulovicz, Peter Baker, KCC; Russ Phillips, Bulant Agrali, Peter Roberts, Bob Clough, South Bulli; Frank Hungerford, Shane, Ray, ACIRL; John Hanes, ACARP

2. Central Colliery, Russ Phillips

Longhole drilling with UDR B15 rig using DHM and single shot. Survey mismatches noted on minethrough due to insufficient length of nonmag rods. Need 6m nonmag rods drilling N-S and 9m for E-W. In 205 Panel, plan to drill 1000m holes parallel to developments with B20 rig. Commenced using Drill Scout March 95 with an improvised cable system. A new cable cassette system is expected in two weeks. In first two shifts, drilled 170m per shift and 100m in 4 hours. With single shot, best production was 150m per shift with average of 60m. With Drill Scout, expect to double this rate. With the single shot, surveys conducted each 12-18m. Drill Scout is continuous MWD. When the drill bit touches the sandstone, the torque increases and then unloads as the bit comes back into coal. The changes are reflected in the Drill Scout tool face angle changes. The torque also increases as the roof is approached reflecting a change in coal strength. The Drill Scout records Dip, Azimuth and Tool Face. The Drill Scout is currently limited by cable resistance to around 750m.

Frank advised that intermittent surveys should be recorded to avoid being on the same flip-flop which can produce a cumulative error.

3. Cordeaux Colliery, Brian Sheldon

Drilling is conducted with a ProRam in 80mm holes with AW rods and no stabiliser. When a stabiliser was used, it caused the drill to intersect roof and floor too often. Core samples are taken at 60m and 120m and the holes are deepened to 150m. When drilling to the north, holes typically swing left towards 290° cleat direction. (Bulant reported a similar experience with ProRam holes at South Bulli where holes aimed at 070° veer to 110° and holes aimed at 110° veer to 070°. Peter Roberts reported that hole directions at West Cliff varied according to the part of the mine). The holes are typically commenced at 30° to the left of the development direction and they swing across panel. The core samples are planned to be taken in front of the two headings. The drills are set up using a compass. In a trial use of the Champ, the longest distance surveyed was 120m on PVC which proved hard work. With the Champ having to be switched on at the surface prior to going underground, it was considered to be user unfriendly as it is difficult to predict at the start of a shift just when the surveys will be recorded.

4 Tahmoor, Peter Baker

By 12/95, expect most drilling will be with DHM. In 506 Panel, flank holes are fairly straight. Holes commenced in other directions can go anywhere. Holes 300m long are drilled across proposed LW blocks. Single shot surveys were conducted on some rotary holes at 10m, 100m and 300m. On mine through, the holes were within 10m over 300m and accepted as reasonably accurate. From 5/94, the Peewee multishot was used. A trial of the Peewee, Champ and single shot in a hole yielded similar results. The tools were run in on AW rods with no nonmag rods. Perhaps this caused the 10m difference on minethrough. The Champ did not indicate any magnetic field from the rods but Surtron advised this could change as the rods were coupled. The main problem with the Peewee was reliability. The first tool was calibrated for the northern hemisphere. With the single shot taking three surveys in a hole, the task takes one shift. With the multishot on AW rods, a hole is surveyed in 2 to 3 hours. Considering using BQ rods and a pump-in camera.

The Peewee costs \$52,000. It is relatively easy to use, but if there is a problem, it might not be discovered until after a day of readings. It cannot be dismantled or unloaded underground but it can be turned on and off. A couple of 45° dips are usually recorded to indicate the start of a new hole. It takes around 15 minutes to develop the 8mm film. The film must then be viewed under a microscope as the record is on a small disk each 6-8mm. Care is required on loading film to assure the film is correctly oriented. A few teething problems have occurred. The first tool developed circuitary problems and had to be returned to USA. When it returned it still had problems. The turn around time sending the tool to USA for service is too long. Mark Frenulavic advised that the West Cliff Peewee was seen to show up to 30° variation when rotated about its axis. The new stainless steel case was magnetised. The old case was alright. A new camera lost focus after measuring in two holes.

Consensus of opinion that although drainage holes appear to have 9m of radial influence, they appear not to drain in front of the hole.

5. West Cliff, Mark Frenulavic

Every hole drilled must be surveyed. All face holes must go in or within 5m of the heading. When 80mm holes drilled without a stabiliser, the deviation is considerable. Now drilling 65mm holes with PCD bit, a stabiliser at the bit and another 1 rod behind. This tends to cause the bit to dive slightly, but the holes are generally alright to 100 to 200m. Single shot manual surveys on conduit can be conducted to 100m. The holes tend to deviate 3°-4° over 100m (previously 30°-40°). ProRams for flank holes using twin stabilisers in 120m holes deviate 3°-5° maximum. Two stabilisers allow the bit to follow the seam, but can

intersect the floor. In core holes, a 65mm pilot bit is used and the hole is reamed to 95mm before coring. With the 95mm bit the holes tend to climb.

Around faults, the hole deviations cannot be predicted. In the 485-486 block, all cross panel holes will be surveyed using a ProRam. Cross panel holes now being drilled with DHM at one hole per shift. Drilling is conducted in the lower half of the seam to avoid the mylonite near the roof which tends to bog the bit. A dewatering tube is placed in every hole to dewater.

The Peewee uses 5 AA batteries which should last 2 to 3 shifts, but are changed each shift for safety. In surveys using the Ramtrack in 270m holes, the Peewee is installed on the end of the EW rods with 3m of nonmag stainless rod plus the barrel placing the camera at 5m from normal rods. The camera is also pumped down BQ rods with the Longyear rig, setting the camera at 40 minutes to 60 minutes, then the rods are withdrawn and the surveys recorded with 2 to 4 minutes between shots. The rods are rotated 90° to 180° to check accuracy. Variations of 0.5° to 1° are recorded. In a recent hole, shots were recorded on the way in and out to check accuracy which was within 0.5°.

All settings of the tool are made on surface, but initialisation and start are on site. The shots must be accurately referenced in a record book, ie shot number, time, depth etc. A stopwatch is required. Surveys are currently conducted by Ray, Mark or two deputies. Tahmoor use a third man in the crew as a recorder. A hole to 260m with the Ramtrack and Peewee takes 2 hours to survey at 4 minute or 21m intervals. Drilling with BQ rods allowing pumpdown of the tool and survey on pulling of rods is ideal. The camera locks in place behind the bit giving a check on retrieval. A non return valve is located behind the bit to prevent camera being pushed back by gas if the hole blocks.

6. South Bulli, Frank Hungerford

Longholes being drilled parallel to developments. A 900m hole was drilled, using single shot, to an aeromagnetic anomaly and a wireline core was taken. When drilling parallel to drivages, HT cable caused survey difficulties. The holes were planned to be 5m from the riblines. Both holes were intersected by the drives, being 7m off line at 150m. Frank set up a trial to determine the effects of various combinations of rods and motor on the survey results. Set up the Champ on a test bearing and took readings. Then approached with Acudrill into its normal position with CuBe, steel etc. The greatest variations occurred with the tool oriented EW and the tool 3m behind the bit producing 0.7° to 0.8° variation or 1.2m displacement over 100m. With 3 CuBe rods between bit and tool, produced 0.2° or 0.4m over 100m. The main influence was the long NQ rods behind the survey tool. There is a need to extend this experiment so that each site knows what variations occur with various equipment set-ups and drilling directions. The Drillex motor is quite magnetised.

Peter Roberts reported that he had just conducted surveys of holes with the Champ inserted on PVC. In one rotary hole drilled NS in 505 Panel using a ProRam, 80mm Widyer, there was a 10° swing to the right over 100m. The Champ is heavy and awkward. It is 3m long (Peewee<1m) and three times as heavy as the Peewee. It is difficult to transport into and out of the mine. It has to be initialised out of the pit, so the time for a job has to be guessed. It runs for 5 hours for 1016 shots. It cannot be pumped in through NQ rods. Peter feels the Peewee is much more user-friendly. The costs of Champ and Peewee are similar.

PLEASE CIRCULATE TO INTERESTED PEOPLE

**NOTES ON MEETINGS OF NSW AND QUEENSLAND IN-SEAM DRILLING
OPERATORS AND SUPERVISORS
APRIL-MAY 1995**

1. NSW 12/4/95

1.1 Attendees: Ken Cheney, Tower; Ian Baillie, ACIRL; Vince Martin, CoalRok; John Weissman, Geogas; Paul Maddocks, Metrop; Bengt Stromquist, Asahi; Brad Neilson, Mark Finlay, Cram; Peter Roberts, Russ Phillips, South Bulli; Peter Baker, Wayne Mulholland, Ron Cassidy, Tahmoor; Malcolm Minnis, Trevor Mole, Boart Longyear; Alan Hargraves, Hargraves Min.Eng.; Collin Correia, Mark Neil, METS; Tony Knight, BHP Tech.Serv.

1.2 Suppliers Reports

Asahi is supplying a 2m long dual camera survey tool consisting of two Eastman single shot cameras which will allow two surveys in a hole, thus halving the handling time. It will be used at Metropolitan. Service of the cameras is provided by ACE.

Cram have decided not to proceed with a B series ProRam. Instead, Cram will offer a Diamec B52 ramtrack rig. It will use a Diamec 262 rod holder and handle BQ rods. To minimise costs, it will be necessary to construct 5 rigs at a time. (The Appin Diamec 251 has drilled B size to 451m). Expected availability July-August 1995.

1.3 Operators Reports

Tahmoor - Peter Baker reported the longwall hit a 40m thick hard sill and is currently pulling off and having to restart 4 pillars inbye. Drilling had previously been conducted on either side of the intrusion, but it could not be penetrated or defined. Peter stated that a pit cannot afford to leave gaps in the drilling pattern. As there is uncertainty and inconsistency of the trajectory of rotary holes, Tahmoor will be converting to DHM guided drilling to improve reliability. It is anticipated that either NQ or CHD rods will be used with the DHM (Slimdrill, Acudrill both used) and 89mm bit. The longest DHM hole to date is 900m plus 100m of branches, general length is 300m. Virgin gas contents not well known, therefore there is a need for efficient coring.

South Bulli - Peter Roberts reported on the drilling of routine flanking long holes for structure and gas content. Cores are retrieved by wireline. Holes are drilled DDM to typical depth of 500m. Rotary holes drilled with a ProRam are surveyed using the CHAMP. Rotary drilling at South Bulli is made difficult by the presence of frequent large stonerolls.

Metropolitan - Paul Maddocks reported that both rotary and DHM holes are drilled at Metropolitan. Across panel drainage holes are drilled as rotary fan pattern. Each hole is surveyed. There is little problem with deviation. Some holes are drilled DHM with single shot survey at 40 to 50m intervals taking as long to survey as to drill a hole. DHM drilling with single shot averages 49m/shift. The maximum hole length at present is 351m. Some rotary holes are drilled with a ProRam to take cores for gas content tests. Cores at up to 170m depth can be retrieved in under 30 minutes, so the gas desorption curve is still in the linear section. The Northwest Returns panel is mining in coal with 98% CO₂ at 8 to 9 m³/tonne. B West has up to 17.7 m³/tonne with bumping.

Tower - Ken Cheney reported that the 3 Kempe rigs with DHM and DDM average 49m/shift. 80m/shift is a good rate for Tower and one rig drilled 190m in a shift (but not much worked after). (Tahmoor DHM+DDM 60-70, Appin DHM+Single shot 30-40). Cores are pulled conventionally up to 500m. Not much face drilling is necessary. Two ProRams

and three Kempes are used on downholes. 40 FEDs are employed full time on gas drainage. No troubles are experienced to 800m with surveys conducted at each 6m motor reorientation.

ACIRL - Ian Baillie reported difficulties acquiring suitable 5mm wireline cable. The cable gets loose strands passing through the stuffing box. Russ Phillips used 3.5mm stainless wire which lasted a long time. Malcolm Minnis reported that the price is the problem. Stainless was the standard for a long time, but it is more expensive. Tahmoor satisfactorily used 6mm ordinary cable from Bulivants to 500m.

METS - Collin Correia reported applications of the METS RIM 2 bore to bore system with some good examples from Appin. Bore depth to 250m and bore separations to 250 to 300m. The probe is 4m long by 48mm diameter. A hole cased in PVC is preferred. The probe can be pushed down the drill rods and out the end. RIM differentiates differences in moisture quite well. Therefore partly drained coal provides better surveys for detecting geological structures which retain more moisture than the normal drained coal. The results must be interpreted in the geological context. Because of their high moisture content, Queensland coals are more difficult to interpret. At Oakdale, RIM surveys are conducted each 200m along the proposed longwall to detect structures ahead of developments. A survey between two bores takes about one shift with a 6 man crew and costs around \$9000.

2.3 Rotary Drilling

General discussion was held on improving rotary drilling accuracy. There is reluctance to convert from rotary to DHM drilling because of the extra capital cost, poorer productivity and higher training/competency requirement of DHM plus the extra 1 to 3 shifts to set up. There is no call for a general research project as there are too many variables between mines, eg the many different rig types, different geology, different bottom hole assemblies etc. There has been much money spent on this and there could be much benefit in revisiting the old research reports. A major priority is for rotary rigs to have monitors fitted and drilling parameters to be recorded and analysed. Mike Kelly made a decision on B rods at Appin for hole stability. At Tahmoor, B rods have produced straight holes. At West Cliff, a Diamec hole with B rods and stabilisers has 2-3° variations whereas a ProRam hole with stabilisers has 3-4° variation. At Metropolitan, the experience is the same when drilling in one direction, but holes near perpendicular to this direction can change through 45°. At West Cliff, using B rods, 80mm bit and stabilisers produces straight holes with little influence from drilling direction. It was suggested that reverse circulation drilling would produce straighter holes as would conventional core holes. RC should have similar penetration rate to rotary drilling. However, because of the stiff rods used, there is a problem if the roof or floor are intersected. Long holes should be obtainable with RC as a Longyear rig has been used by Cleveland Potash to drill 2000m. There has been little local experience drilling RC in coal, but there has been some experience in stone.

Comment - cores are being taken at depths for gas content testing. Conventional pulling of rods is time-consuming and can lead to significant errors in gas content estimation. Wireline recovery of cores reduces the time and improves the reliability of gas content tests, but having to replace the motor and bit with a barrel and core bit each time a core is required is also time consuming. RC drilling, if straight could provide a solution.

2. QUEENSLAND

2.1 Attendees: Malcolm Waterfall, Glen Everett, Central Colliery; Phil Draheim, Moura; Greg James, Cram; Rod Erwin, Gary Powell, Strata Drilling; Mat Stockwell, CMTE; Malcolm Minnis, Boart Longyear.

2.2 Reports

Central Colliery - Glen Everett reported that drilling is conducted in a 800mm window at the top of the seam and above the shear zone. Drilling with the Drill Scout MWD survey tool was conducted in April. The first two shifts achieved over 100m each. The tool then malfunctioned. A second tool was used and it malfunctioned. Both motors were returned for repair. The continuous readout of tool face angle provided good information for drilling control obviating the need to make allowances for torque buildup in the rods. Proximity to the roof or drilling in the upper dull coal was indicated by a change in torque which was reflected by the tool face angle changes. Strata Drilling were informed later that a low rpm motor with a shock absorber between the motor and survey tool are necessary. The tool had been used with a high (600) rpm motor and no shock absorber. The tools were vibrated excessively. The tool has been repaired and returned to German Creek where it will be used with a 300 rpm motor and shock absorber. During the tool's absence, 5X100m holes have been drilled using a single shot tool with a 600m hole taking around 10-13 shifts including the setup, standpipe and insertion of polypipe for water drainage. 100-120m per shift is expected using the Drill Scout. With the current setup, the survey tool sits 7m behind the bit. There is a need to reduce this distance if possible to make surveys more representative of the bit location. Strata Drilling have built a purpose device for running in polypipe. Central require the drilling of 1300m holes from each end of the 1500m longwall blocks.

At Moura, gas make from the underground mine was 80 million cubic metres per year, half of which came from drainage. With similar gas make potentials from the rest of the Bowen Basin, there will be a need to predrain gas prior to any underground mining. To prove predrainage is feasible, a trial program of long holes from the highwalls has been initiated. The first phase of the trial included the drilling of three angled holes from the surface at inclinations of 15, 20 and 27 degrees down into the A, B and C seams respectively. These holes were drilled with 2³/₈" DHM through the overlying strata curving into the coal seams and continuing to lengths of 1056, 1109 and 700m. The holes were drilled by Pontil Drilling using their Wellnav survey tool. Drilling took 6 minutes per 6m rod and another 6 to 8 minutes per rod to hook up the survey tool cable. The second phase of the trials has involved drilling 1000m+ in-seam holes into the highwall. The first hole was drilled with a converted surface rig (on its side) using the Mecca survey system. This was the first field trial for the Mecca system and it encountered a couple of minor problems which are being addressed. Water leaked into the cable under the external sheath via the joints thus causing shorts which produced false signals and flattened the batteries. The flat batteries lead to misleading false data signals. AMT have been requested to consider incorporating MWD tool face angle readout into the system. At 1000m, the torque effect on the rods can produce a 9° error in tool face angle. The maximum variation of the holes drilled has been 15m, but most of the holes have been within 5m of the planned line. The time to drill a 1100m hole has been about 32 shifts. Best rate has been 140 m/shift and average 80-90.

Matt Stockwell reported on the CMTE Water Jet Assisted Rotary drilling project which will use water jets with conventional rotary drilling to reduce the stress on equipment and improve drilling accuracy by reducing thrust. Water jets should also be applicable to DHM drilling. There should also be the facility for slotting of holes with water jets for destressing or degassing. The equipment includes a 650 bar pump which can deliver 250 litres per minute at 80Mpa. The German Creek trial only used 70 litres per minute ie similar to conventional drilling, and the indication is that higher flows should not be necessary. The equipment will be trialed at Appin Colliery over the next 6 months.

3 GENERAL

3.1 Broken Rods

Dr Ian Gray of Sigra has requested some broken drill rods for testing as part of his ACARP project with Uni Q on testing of Drill Rod Joints. He would like to have both sides of the break. Could you please send some broken rods to him at the following address. He will provide you with a copy of his test results on the rods.

send to:

Dr Ian Gray
Sigra Pty Ltd
32 Norman St
Coorparoo Qld

3.2 Improvement of Meetings

The following suggestions were made to make our meetings more effective. Please take note and act for the next meeting.

- Supervisors, researchers etc to prepare their presentations and bring appropriate plans, diagrams, overhead transparencies,
- Supervisors to come armed with hard facts on rod sizes, bit diameters, hole diameters etc. Perhaps a summary sheet showing these data from each pit could be provided at next meeting and circulated with the notes.
- Each supervisor to bring 2 or 3 drilling operators to the meetings.
- When a supervisor has a concern, a special interest or a question, he should advise J. Hanes so the matter can be raised at the next meeting for general discussion and hopefully for sharing of knowledge. ie special topics or themes, it's up to you.
- There is a need to expose supervisors to what is happening overseas,
- There is a need to define our inseam drilling problems and seek solutions outside our industry.

3.3 Definition of Terms

Prof Hargraves raised his concern over the common "misuse" of some terms such as "downhole motor" for "in-hole motor". He will address this matter at the next NSW meeting.

4. NEXT MEETINGS

Tentative dates for the next meetings are as follows. Please note them in your diaries and I will confirm a few weeks beforehand.

NSW - Wednesday, 26th July, 9am Wollongong Master Builders, Church Street Wollongong.

QLD - Wednesday 4th October, 10am Moura Mine, with inspection of surface installation for inseam drilling.

John Hanes
Coordinator of ACARP Inseam Drilling Research
24/5/95

PLEASE CIRCULATE NEWSLETTER TO INTERESTED PEOPLE

NSW IN-SEAM DRILLING MEETING

26TH JULY, 1995

PLEASE PROVIDE A COPY TO INTERESTED COLLEAGUES AND YOUR MANAGERS

1. ATTENDEES

Ron Halsey, Oakdale; Mike Ogilvie, R. Lama, KCC; Alan Hargraves; Ray Williams, Geogas; Paul Dunn, Matt Stockwell, Dominic Howarth, CMTE; Paul Thompson, Appin; Richard Danell, BHPR; Mamdouh Agawani, UNSW; Bulent Agrali, South Bulli; Ron Cassidy, Tahmoor; Malcolm Minnis, Boart-Longyear; John Martin, Paul Smith, Paul Maddocks, Metrop; Blake Eager, Ken Cheney, Tower; Wayne Murray, Chris Williams, CSIRO; Steve Beikoff, Oceanic; Frank Hungerford, Shane Arnold, AMT Drilling; Mark Menegazzo, MMI; Brendan Pipcocic, Dam Truong, Ian Baillie, Vince Martin, ACDRILL; Martin Mulliner, Richard Grigg, Surtron; David Price, ACIRL. Total 30.

Report on ACARP Project on Borehole Stability - Dr Ripu Lama

The project is in completion stage and the final report should be ready by end August. Some highlights are as follows. In high ground fluid pressure conditions, smaller diameters should produce less stable holes. In South Coast mines where the stability problems are mainly due to structures, casing is installed to maintain stability. In civil engineering holes, dual motor rigs are commonly used to install casing as the hole is advanced. In the Warrior Basin (USA) much of the drilling is with auger drills, but stability is not a problem. The report addresses bit types for minimal hole damage (eg those which produce smaller chips). Penetration rates must be reduced through unstable ground to reduce hole wall damage. At West Cliff, it is suspected that around 5% of holes collapse, but the industry cannot accept 1% of holes collapsing unless it is known which holes have collapsed. Ray Williams raised the point that the 95% of holes that remain open are not the critical holes where outbursts are concerned. Holes drilled parallel to maximum principal stress are more stable than those drilled perpendicular. Sacrificing drill rods as casing was raised. Malcolm Minnis advised that ACIRL used sacrificial outer rods as casing at South Bulli, but also suggested installing casing and cutting it off just outby the unstable zone to minimise the amount of casing left in the hole. With the use of PVC being more acceptable, its ability to resist crushing in the hole was questioned. Ripu believes that drilling of the hole destresses the coal surrounding the hole and should therefore reduce the risk of casing collapse.

2. OPERATORS REPORTS

Tower Colliery - Blake Eager

Tower operates 3 Kempe drills for in-seam longholes and 3 ProRams for cross measure drilling. All in-seam holes are surveyed with AMT DDM's (4). Longwall blocks are drained 8-12 months and then longholes are drilled to 580m ahead of developments with cores each 70m to test drainage efficiency. Gas contents are typically dropped from 15 m³/tonne to 1-6 (av 2-3) m³/tonne. Around a dyke, 15 holes were used to reduce gas content to 3 m³/tonne in 2 months. Blake suspects that the downholes to the Wongawilli seam (-30°) flatten and do not fully penetrate the seam. The main challenges at present are the need for straighter ProRam holes for coring ahead of the face, better longwall gas capture and successful drill water management. Manning is a problem as the work exceeds the manpower.

Metroplitan - Paul Maddocks

Because of the problems with rotary holes deviating up to 45° in 70m, a longhole rig has been complimented by an AMT DDM Upgrade and Paul believes Metrop has to aim for all holes to be directionally drilled. The longwall was due to commence 27th July. Problems are similar to Tower's.

Appin - Paul Thompson

Appin plans to employ 25 new drillers. Some vertical holes have been drilled to the Wongawilli seam to monitor pressure changes accompanying the longwall passage.

ACDRILL - Ian Baillie

The new joint venture between ACIRL and Rockdrill is drilling in two collieries. At South Bulli, the LM75 is being used to take spot cores ahead of proposed developments for gas contents. At Ellalong, drilling is being conducted to investigate the structure of the next longwall. A 10m fault has been detected.

AMT Drilling - Frank Hungerford

Drilling a series of 150 X±200m holes north of North Cliff to test for known structures. Using Boyles B15 sled mounted rig with DDM + Mecca. Averaging 2 holes per week at 150m to 170m per shift. Surveys are conducted each 6m taking 3 seconds per survey. The Mecca system was trialed at Moura by Pontil with surveys to 1350m.

Tahmoor - Ron Cassidy

Operates 3 DHM rigs, two with DDM and one with single shot, plus two ProRams and two S&K electric-hydraulic rigs, one on in-seam and one on cross measure holes. Insufficient labour and a lack of labour skilled with use of the DDM are the main problems.

RESEARCHERS REPORTS

ACIRL - David Price

The borehole caliper tool prototype has been trialed. The project was delayed by the restructuring at ACIRL and it is now time to decide whether to complete or shelve the project. Frank Hungerford advised that in the trial the tool was pumped down BQ rods and allowed to protrude from the end. Measurements with a strain gauge were recorded manually. The applications will be mainly for recording variations in diameter of shorter holes. Expected cost per unit will be \$10,000. It was considered by the meeting that a caliper tool would be useful for detecting structures in holes and should be given a fair trial. The project should be completed.

CMTE - Dominique Howarth, Paul Dunn

Dominique introduced the three projects being conducted by CMTE (Centre of Mining Technology and Equipment). These are Tight Radius Drilling, Drill Position Sensing and Water Jet Assisted Drilling. Paul Dunn spoke on the Water Jet Assisted Drilling project which is to be trialed at Appin Colliery. This uses Longyear high pressure rods, a bent sub for steering, retro jets and a Womer water jet. Initial trials at German Creek drilled to 400m in seam with the holes bending parallel to cleat. A flexible hose can be used with the retrojets to give appropriate thrust for drilling at 2m/min to 100m. At Blackwater, a slot of 20mm width was cut along a 120mm (av) diameter borehole wall. Water jet assisted drilling will use rotary drilling with a PDC bit and water jets. At Appin, water jet and assisted drilling will be compared during drilling of 9X250m holes. It is hoped that the water jet assistance will allow drilling with reduced torque and thrust on the bit resulting in straighter holes. The current research pump is a large 200lpm pump which can drill large diameter holes with water jet only. Assisted drilling will only require small pump. Trials will be conducted at 40Mpa and 20Mpa. The latter will use 100 lpm water. CMTE has applied for further ACARP funding to test WJ in mylonite. Prof Hargraves advised that he used water jets at Corrimal Colliery to successfully erode mylonite and therefore prevent outbursts.

CSIRO Radar - Wayne Murray

A prototype tool has been miniaturised and trialed. It uses a single coax cable for communication. It was recently trialed at West Cliff by pushing in on PVC. It was found that the bow tie antenna is sensitive to water quality with salty water reducing the performance. A trial will be conducted at West Cliff in August of a modified radar as well as a radiometric tool as part of the CMTE Drill Position Sensing project.

BHPR Drill Monitor - Richard Danell

Drill bit location sensing using acoustics has been shelved due to poor results from early trials. The monitored ProRam has been in use for a year and is successfully locating structures in holes. Some modifications are now being conducted along with calibration. Mylonite is best indicated by water flow, penetration rate and feed pressure. The documentation for IS approval of the 486 PC for data acquisition and recording has been submitted to Londonderry. The system will provide real time display at the rig of the log of the last 3m drilled.

SUPPLIERS REPORTS

Boart Longyear - Malcolm Minnis

The Wollongong branch has now been closed and Malcolm is shifting to Cardiff. Longyear supply monitored rigs to the metalliferous mines and it is hoped there will be IS monitored rigs in the future.

Surtron Technologies - Martin Mulliner

The Drill Scout is available for purchase at around \$80,000. It is the only fully IS approved (Australian Standards) MWD survey tool available. It has been used at Central Colliery where some problems were encountered and overcome with shock absorption. Surtron also distribute the CHAMP survey tool (with both Fluxgate magnetometers and accelerometers) which has been used at South Bulli and Drillex inhole motors and will be the Australian suppliers of Drillex.

The Drill Scout provides real time readout of the bit attitude during drilling. The short (about 50cm) tool resides behind the bit and communicates to the readout box via a single strand wire which is retrieved from mandrills of 300m per mandrill. Beyond each 300m, another mandrill is inserted. The recording box contains the power source. It is designed as a low cost survey tool. Its accuracy is as good as that of a single shot. Its OD is 1.625". Martin considered the Drill Scout should be robust enough for use in rotary drilling. It has been tested to over 1000m but reliability depends on conductor cable diameter. The tool is available for purchase and use and was demonstrated at the meeting. Martin can be contacted on 09 4305116 or fax 09 4304025.

SPECIAL BUSINESS

Bulant Agrali, Senior Geologist at South Bulli warned that for accurate identification of geological structures, drillers logs must be complimented by good geological sense. As an example, Bulant described a case where drill logs indicated no dyke in an area where a dyke was inspected. The drill holes had passed through a gap in the dyke. In another case, the mine was stopped because the drillers logs recorded a structure ahead of the face, even though the measured gas content was $<1\text{m}^3/\text{tonne}$.

The next Wollongong meeting is scheduled for Wednesday 25th October 1995 at the Illawarra Master Builders Club, Church St Wollongong. Please note it in your diary. A special meeting will be held for all interested in the Newcastle-Hunter area on 23rd August - contact me for details. The next Queensland meeting will be held at Moura Mine on Wednesday, 4th October followed by a researchers and suppliers meeting at CMTE, Brisbane on Friday 6th October.

This meeting was recorded on videotape which is available for short term loan. Please contact me to borrow it.

Ian Gray has not yet received any broken rods for testing. Could you please forward any broken rods to him so his project can proceed. The information which will come from this project will help the industry.

JOHN HANES, 042 291349

PLEASE CIRCULATE TO INTERESTED PEOPLE

**NOTES ON MEETINGS OF NSW AND QUEENSLAND IN-SEAM DRILLING
OPERATORS AND SUPERVISORS
SEPTEMBER - NOVEMBER 1995**

1. NSW NEWCASTLE/HUNTER VALLEY 20/9/95

1.1 Attendees: Malcolm Ives, Michael Creech, Power Coal; Ian Baillie, ACDRILL; Peter Cook, Ellalong; Malcolm Minnis, Boart Longyear; Bruce Ross, Oceanic; Les Lunarzewski, Lunagas.

1.2 Operators' Reports

Power Coal - Malcolm and Michael recently employed as Power Coal's first geologists. There are 8 collieries in the group, two of which are longwall pits. A small amount of exploration in-seam drilling was commenced in 1994. There is increasing need for 500m to 1000m exploration holes, especially in the longwall pits.

Ellalong - In-seam drilling is becoming more important as an exploration tool. Newer longwalls have been oriented parallel to maximum principal stress to reduce mining strain. ACDRILL drilling to test faulting in proposed longwall blocks and developments. At Munmora Colliery, an in-seam hole was drilled to intersect the goaf of Endeavour Colliery to investigate the site of an explosion. At United Colliery, ACDRILL investigated a structurally complex area.

Oceanic - IS drilling is being conducted at West Wallsend to investigate proposed longwalls which are penetrated by dykes. Demonstrated how critical it is to pre-drill proposed drivages through dykes to improve mining conditions predictions. Hole caving makes drilling of dykes and faults difficult. Most drilling is rotary to over 1000m with some downhole motor drilling. The Longyear LM37 rig has recently been replaced with a LM75. Whereas the smaller rig was more sensitive to geological structures, it is easy to drill through soft dykes up to 0.5m thick or a small fault with the LM75 and not notice it. Rotary drilled cuttings are very fine and difficult to assess. Seam splits and rolls make drilling difficult as it is possible to drill off into a split and believe the bit is still in the main seam. Roof/floor proximity control is desirable. Holes to 1300m are rotary drilled with BQ rods. Survey is by single shot. If roof is intersected, RPM increased to drop the bit. If floor is intersected, increased bit pressure will lift the bit. Most longwalls in the area encounter small faults <0.5m. Best shift of drilling produced 330m, average is 100m per shift including SS survey and colliery downtimes. Occasionally cores at up to 1000m using a wireline barrel.

1.3 Suppliers Reports

ACDRILL - The LM75 is at Wyee drilling exploration holes. The Acker rig is at Ellalong.

Boart Longyear has automated drill rigs operating in metalliferous mines, but they are not intrinsically safe.

2 NSW WOLLONGONG 8/11/95

2.1 Attendees: Ian Baillie, ACDRILL; Russell Chown, David Walker, Geogas; Paul Maddocks, Metrop; Bulant Agrali, South Bulli; Nicole Brook, Tahmoor; Malcolm Minnis, Boart Longyear; Scott Thomson, METS; Alison Ogden, BHP Tech.Serv.; Ripu Lama, KCC; Brian Sheldon, Anthony McEwan, Terry Stewart, Cordeaux; Richard Walsh, Mark Frenulavich, West Cliff; Wayne Murray, Chris Williams, CSIRO; Frank Hungerford, Shane

Arnold, Gordon Paterson, AMT; Ron Halsey, Oakdale; Russell Rigby, Ellalong; John Kelsey, UDR; Richard Danell, BHPR.

2.2 Operators Reports

West Cliff - Drilling is now conducted mainly as DHM drilling except for some face flank holes. Surveys have indicated that rotary holes have deviated up to 150m from intended trajectory. Controlling factors for deviations are not known. Mark noted that drilling with a 3 prong drag bit produced much deviation. Introduction of a pineapple bit saw better penetration and deflection from the roof, but deviation still a problem. The combination of a PCD bit and twin stabilisers improved hole straightness, but the hole tends to dip. One stabiliser immediately behind the bit will cause the bit to rise. With accurate drilling, gas contents of +14m³/tonne have been reduced to around 4. A trial was conducted at West Cliff recently of the CSIRO/CMTE roof/floor proximity sensing tools. Wayne Murray (CSIRO) showed the results of the radar tests which detected the roof and floor well when the probe was within 1m of the stone. A test over a mylonite zone perpendicular to a test hole did not give a good record, but a test run across mylonite sub parallel to the rib gave a good signature. The radar is not efficient for detecting structures at right angles to the sensor. Results of the radiometric trials were not available for the meeting, but are understood to be favourable.

South Bulli - 800m of a 2400m program have been drilled. Traces of two DHM holes drilled parallel to gateroads, were found in the roadways, ie 12 to 18m from where they plotted. Surveys with single shot were conducted each 18m. (Paul Maddocks noted that at Metrop, holes can be 5m from plotted locations and surveys at 5 to 10m intervals improve the accuracy.) Some short rotary holes are also drilled. Bulant stressed the need for rig monitoring to ensure important changes are recorded.

Cordeaux - Still drilling rotary holes with ProRam. Some holes drilled in the Wongawilli seam are straighter than holes in the Bulli seam.

Metropolitan - Deviations are common in rotary holes. Holes drilled parallel to gateroads are only confidently drilled to 40 or 50m because of unpredictable deviations, but holes perpendicular to the roads are OK. DHM holes also try to follow the "grain". DHM holes being drilled to 850m and Metrop is committed to a second DHM system. A trial for a vacuum plant is being conducted. RIM has been successfully used to define areas of poor drainage. RIM clearly shows coal that has been resaturated by water from the DHM.

Tahmoor - Some holes have been drilled through the dyke which has been cased with Fraz. The Propet, or Domino mounted twin motor ProRam uses 2m AW rods, 65/85mm Driltex bits for 270m holes at 1200mm/minute drill rate. Setup takes 15 minutes. The new longwall block is being investigated by branched DHM holes and ProRam infill holes. RIM is proposed between holes to locate structures.

Ellalong - The 3.5m to 6m thick Greta seam is mined. The previously mined southern area at 700m depth had +9m³/tonne mixed gas. Drilling was accompanied by bumps and hole closures due to stress. In the shallower northern part which has no gas, drilling is easy. Drilling to around 1000m is for structures using the ACDRILL Acker rig, DHM and single shot survey.

Gretley - A miniwall is operated under some Newcastle residences. A Mole rig on an Eimco is used to drill 100m AW holes to detect dykes. The drill typically stops on hitting a dyke. Tunnel boring trials are planned and these will require detailed levels ahead of cutting. Drilling will be escalated.

Oakdale - Surface drainage plant installations should be operational by January 1996. 28 in-seam holes are currently venting to atmosphere. 2.5 to 6 m³/tonne at 98% CO₂, will increase with depth. 2000lps expected on -55kPa. Drilling is conducted under contract with a ProRam. Flank holes (100m) are drilled with a Pet-mounted Gateway rig (similar to ProRam). 185m drainage holes are drilled across the blocks with little deviation.

Appin - The BHP Research monitored ProRam drill has been gathering data in a structurally complex area at Appin. Zones of harder and softer drilling were logged on the penetration rate log. Gas pushes were recorded as reductions of water inflow. The holes were drilled prior to a small 2 tonne outburst which extended 0.5m into the rib. It occurred on a small strike slip fault. Gas content 10m³/tonne at 10% CO₂. Mining induced fractures were essentially absent. The remaining coal around the cavity was quite hard and one hole within the hard coal displayed concentric fracturing. The holes were not surveyed so there is some uncertainty as to which hole was associated with which record. Soft drilling zones correlated well with mapped mylonite. The intrinsically safe 486 computer has been submitted to Londonderry for approvals. A trial of waterjet assisted drilling by CMTE is to be conducted prior to the end of 1996.

2.3 Suppliers Reports

AMT - Drilling at Moura by Pontil using the AMT DDM survey tool encountered problems when drilling through the strong interburden sandstones. The rubber shock absorbers in the DDM were reduced to powder by vibrations. The main vibration is due to longitudinal vibrations. Shortening the shock absorber mountings has corrected the problem. To further reduce the vibration problem, a high speed, high torque Acudrill motor and Longyear PCD bit with 13X7mm cutters will be used. At Northcliff, around 100 holes have been drilled, each around 230m long, using a UDR Boyles 15 rig plus MECCA. Drilling 6 to 7 holes per week equates to 1500m/week at 100m/shift including site moves. Aim to drill within a 2m window but the actual window is 0.5m. (This is vastly different from the 5m accuracies stated by mine operators. Why? JH). Work will start soon at Appin drilling exploration/drainage holes to 1200m ahead of developments. AMT will be agents for Acudrill motors. AMT USA use impregnated bits rather than PCD cutters as they need to produce clean holes free from cuttings. The impregnated bits result in a reduction of penetration rate from 1.0m/min to 0.6m/min.

ACDRILL - The LY75 rig is at South Bulli drilling flank holes with cores each 200m. A Drill Scout survey tool will be used at South Bulli.

METS - At Tower, RIM tomographic images shot from gate to gate pre and post water infusion to check efficiency. Ahead of Hume Panel, conducted imaging from 320m holes. Now need to develop method for inserting probes up to 1km ahead. At Tahmoor, RIM is conducted immediately after drilling to check for structures. If no structures are indicated, drilling intensity can be reduced. At Appin, gate to gate RIM indicates the 110° structures by remnant moisture post drainage. At Metrop, RIM is being used to assess drainage efficiency. Efforts are being made to standardise presentations (colours etc) to allow better comparisons over time and between places. Work is planned for Dartbrook, Tarong, Callide and Blair Athol. RIM was recently used at Newcastle to locate 1820's workings. RIM intellectual property is now Australian owned.

Norm Blanch of Strata Drilling (drilling at Central Colliery, Middlemount) reports that the Drill Scout is now working well. Surtron supplied a shock absorber to use with the tool. Norm has drilled a 1000m hole with the Drill Scout plus shock absorber without any problems.

3. QUEENSLAND

3.1 Attendees: Phil Draheim, Moura: Greg James, Cram; Robert Dixson, CMTE; Malcolm Minnis, Boart Longyear; John Kelsey, UDR.

3.2 Reports

At Moura, drilling is conducted from the open cut highwall into the exposed seam and also into underlying seams. The objective is to degas the coal. It is intended to compress the gas and feed it into a pipeline for sale. The program commenced with holes drilled from the surface to determine how long a hole could be drilled and how deep of holes could be accessed. A vertical dewatering hole was drilled. They then moved to a highwall and commenced drilling with two rigs. One is a converted top drive surface rig owned and operated by Pontil using a Wellnav survey tool and the second is a UDR underground rig owned by Moura and operated under contract by AMT using an AMT DDM+MECCA. Both are installed inside protective structures which protect men and equipment from falling rocks. The B and C seams are 45m and 50m respectively below the A seam. Holes are drilled in the A seam and from the A seam floor cross measure to and in the B and C seams. Some vertical holes have been drilled ahead of the inseam holes for dewatering. The water head from the coal seams reaches to within 15m of surface and gas will not flow without dewatering. Dewatering by the vertical holes produces 900 litres per day. In pit C, holes in the A seam have been drilled to 1351m and 1200m, each stopping because of survey tool failures. The initial holes had 6m standpipes which proved inefficient due to the wide blast damage zone. Now using 26m standpipes. Have run 1.5" galvanised dewatering pipes in the holes and are producing 250m³/hour gas and 5 lpm water. A pattern of vertical holes at 300m centres along 100m spaced lines over the proposed inseam holes have been drilled to provide drilling level control. Drilling through the interseam sandstones (100mPa) caused vibration damage to the survey tools. To reduce vibration damage, the following have been trialed; 1. Don't survey in stone, 2. use mud in stone, 3. Use heavier nonmagnetic rods or 4. Longyear bit with 7mm diameter cutters.

A visit was made to inspect the gas compressor plant, the vertical dewatering holes, and the two inseam drilling operations. Phil's hospitality was exemplary.

4 RESEARCH

Behind the scenes, advances have been made in the ACARP funded research projects. Reports on the BHPR and CMTE projects were included in the Wollongong operators report (section 2.2 above).

The AGA borehole pressurisation device with integrated cuttings sampler which should reduce the time needed for assessment of gas pressures ahead of the face has been completed and is ready for trial. This tool will be required for use of integrated roof/floor/structure detection tools planned for behind the bit.

The Sigra drill rod testing rig has been constructed and is being calibrated ready for testing of drill rod joints. The rig will also be used for testing the AGA drill bit torque, load and RPM sensor which will have an integrated survey tool (not ACARP funded) to enable measurement and location of changes in drilling characteristics at the bit in both rotary and guided drilling.

For 1996, the following projects have been approved for ACARP funding:

- J.Hanes, Coordination of Inseam Drilling Research (should be last year)
- Sigra, Trial of Borehole Pressurisation and Cuttings Sampling System for Outburst Assessment
- CMTE, Waterjet Assisted Rotary Drilling

- CMTE/AGA, Integration of Survey, Roof/Floor and Structure Sensing Tools
- Sigra, Gas Drainage Flow Meter`

Is the research worthwhile? It takes time. The suppliers of survey tools have responded to industry requirements and survey capability now far exceeds what it was even two years ago. The Longyear bit with smaller cutters to reduce vibration is one example of many of a supplier response to an operator problem. Hopefully next year, the NSW Department will approve the BHPR 486 computer for use underground. Such computing power is essential for sophisticated in hole logging of structures etc. The cuttings sampler should provide prompt answers on outburst potential. Within a few years, new generation sensing and survey tools will be available for logging the changes in material drilled by the bit as well as proximity of the bit to roof, floor and geological structures as well as the bit location. These tools are being developed for rotary and guided drilling and answer the requirements for knowing where the bit is relative to roof and floor and what structures occur in the hole. As well as ACARP funded research, much R&D is conducted by operators and suppliers to solve shorter term problems and keep mines operating.

5 GENERAL

5.1 Broken Rods

Dr Ian Gray of Sigra has requested some broken drill rods for testing as part of his ACARP project with Uni Q on testing of Drill Rod Joints. He would like to have both sides of the break. Could you please send some broken rods to him. He will provide you with a copy of his test results on the rods. Without your help, good research cannot proceed.

send to:

Dr Ian Gray
Sigra Pty Ltd
32 Norman St
Coorparoo Qld

5.2 Oil Technology Transfer

The Wollongong meeting was asked if there was interest in a workshop on oilfield horizontal drilling technology. Several operators indicated their interest. J Hanes will communicate with a few potential workshop leaders and obtain topics and costs and report to meetings early next year. Please let me have your suggestions.

6 NEXT MEETINGS

Tentative dates for the next meetings are as follows. Please note them in your diaries and I will confirm a few weeks beforehand.

Wollongong - Wednesday, 28th February, 9am Wollongong Master Builders, Church Street Wollongong.

Newcastle/Hunter - Wednesday 10th April, 9am Ellalong Colliery

QLD - Wednesday 24th April, 10am Central Colliery.

I thank all of you for your help this year and I look forward to our continuing association next year. I wish you a happy and healthy Christmas and New Year.

John Hanes

Coordinator of ACARP Inseam Drilling Research

15/11/95

PLEASE CIRCULATE NEWSLETTER TO INTERESTED PEOPLE

C4035 - CO-ORDINATION OF IN-SEAM DRILLING RESEARCH END OF YEAR REPORT FOR 1995

THE PROJECTS

1993 - The SIMTARS project by Ian Gray, Optimisation of Longhole Drilling was reported early in 1994 and provided an insight into the problems for drilling longer holes. A major problem is that the currently used rods are not suitable for longer holes, especially if the holes are not straight. Follow-up research projects have been approved. The project on Maintaining Holes in Unstable Ground by Ripu Lama was completed in December 1995 after several extensions requested by REI, the US consultants contracted to provide an assessment of in-seam drilling technology in unstable ground. Reports received from REI were disappointing and Dr Lama had to prepare the bulk of the report minimising the role of REI. The reports on both of these projects are comprehensive and provide good bases for drilling design.

1994 - 1995 Seven projects were approved in 1994 and in 1995. The BHPR project, Drill Monitoring and Bit Location Stage I was completed on target and Stage II commenced, The monitored ProRam drill being used to drill several holes in both structured coal and clear ground. The feasibility study on the use of seismic to locate the drill bit showed the technique was not promising. ACARP funding was committed to stage II of the project in 1995 to further develop the structure detection system including a 486 IS computer. The computer was submitted to Londonderry for approvals in late 1995. Field results presented in late 1995 showed that the system could detect geological structures in boreholes and could indicate surges caused by increased gas flow. The final report is due in first half 1996.

The Lunagas project conducted in 1994 on Equipment for a Drilling Fluid Logging System was completed with the design of a system for logging gas contained in the drill fluid. Input by the Canadian consultant was disappointing. Although ACARP funding was sought for stage 2 in 1995, it was not approved as it was decided that Lunagas should advance the project with interested mines and the project is progressing with support from BHP Collieries.

The ACIRL caliper probe was field tested and redesigned to allow for shortcomings in the prototype. The project temporarily halted due to the changes in personnel at ACIRL. Following a review of what was required to complete the project and a favourable response by NSW operators to having a simple calliper, it was decided to complete the project. It is due for completion in first half 1996.

The AGA project on the Borehole Pressurisation System is progressing well and now only requires field testing. The design of the equipment was extended to incorporate a pressurised cuttings sampler for determination of coal gas pressures. This addition greatly increases its chance of being adopted by the industry as a possible means of quickly assessing outburst potential. The pressurisation system is due for trials at Tahmoor during first half 1996 and a new project to develop the system for outburst assessment was approved for 1996 (C5034).

The AGA project to develop a Bit Torque, Load and RPM sensor has progressed to completion of design with some delays pending construction of the drill rod test rig as part of project C4039. The second stage of the project in 1995 provided electronics for the device. Ian Gray is (as a private project) incorporating the sensors into a tool which also contains an AGA-designed survey tool.

The AGA project to prepare electrical and mechanical standards for in-hole equipment grew beyond its original specifications (except for cost). The project was completed in 1995.

CMTE received ACARP funding for 1995 for part of their project on sensing of the roof/floor and structures in boreholes. This project is advancing well and preliminary underground testing of the radar and radiometrics tools was conducted at West Cliff Colliery in late 1995.

The project on Research Co-ordination has concentrated mainly on facilitating communication between all players.

1996

The following extra projects are to be monitored in 1996:

C5028	Waterjet Assisted Drilling of Inseam Cross Panel Methane drainage Holes	CMTE
C5029	Combined Survey, Drill and geophysical Sensors for Use in Downhole Motor Drilling	CMTE
C5030	Development of a Gas Drainage Flow Meter	Sigra
C5034	Development of the Borehole Pressurisation Tool for Outburst Assessment	Sigra

COMMUNICATION

To maintain communication amongst all players, four operators meetings were conducted in NSW, one at Newcastle and three at Wollongong, two operators meetings in Queensland, and two researchers' meetings in Queensland during 1995. These meetings were all well attended and the attendees participated well, sharing their considerable experience. The operators' meetings were attended by suppliers and researchers as well as drilling personnel from the mines. The researchers' meetings were attended by researchers involved in the ACARP projects as well as interested CMTE personnel and some suppliers who contributed valuable experience.

Presentations were made to The Sydney Basin and Bowen basin Geologists meetings at Muswellbrook and Mackay, and to the ACARP Outburst Symposium-cum-Workshop. Review meetings for CMTE drilling and coal seam gas were attended.

Suppliers are responding to needs expressed by the inseam drilling operators. The AMT MECCA system was released in December 1994 and extensively trialed at Moura during 1995. AMT are also working on their "Profiler" system for locating the roof and floor relative to the bit and on the "Bullet", a tool for rapid surveying of predrilled holes, but progress is uncertain. Surtron Technologies introduced their CHAMP and Drill Scout Survey tools into the industry and both tools are being used by Shell. Although interest in the Drill Scout was expressed by NSW operators at an operators meeting, the operators have expressed some disappointment in Surtron's apparent lack of back-up for the tool. ACIRL drilled the longest hole in coal (1530m) using a Longyear rig designed to overcome the 1000m paradigm. Boart-Longyear cooperates with operators to produce job-designed drill bits, etc. Their plant at Adelaide is well worth a visit to see just how much effort goes into design and quality control. Other suppliers use the meetings as a sounding board for what the industry requires.

Surveys were conducted for the ACARP Outburst Workshop to assess what the main problems facing the mines were and what research was required by industry. The main problems were (in order of priority):

- a) Detection of structures,
- b) Drilling inaccuracy,
- c) Drillhole surveys,
- d) Face gas content determinations and
- e) Understanding the outburst mechanism.

The highest research priorities were assigned as follows:

- a) Definition of an outburst,
- b) Accurate drilling,
- c) Structure detection,
- d) Rotary drilling survey tool and
- e) Understanding the outburst mechanism.

Three of the top five research requirements are for in-seam drilling functions.

Oil and Metals Drilling

Visits were made to Surtron Technologies, Halliburton, Baker Hughes and ACE Drilling in Perth, to Boart Longyear in Adelaide and to University of NSW to assess the potential for technology transfer or interaction from oil and metals to coal in-seam drilling.

Baker Hughes and Halliburton are major service providers to oil exploration. The former are not interested in coal work because of the low budget levels. Halliburton are interested in providing any help to the coal industry that they can, at a cost. Halliburton are prepared to provide a drilling engineer to visit in-seam drilling operations to assess problems and to suggest solutions at a daily charge of around \$1000 plus costs. Martin Mulliner of Surtron and Dr Mamdovh Agawani of Uni NSW are prepared to present workshops on oilfield drilling technology at a cost. Other potential oilfield drilling "experts" are being considered also with the aim of running a one day workshop on oilfield drilling technology for in-seam drilling supervisors. Consideration is also being given with Peter Hatherly to the potential to bring together drilling supervisors and operators from the metals and coal industries for technology exchange. John Pembroke of ACE Drilling is active on ADITC (Australian Drilling Industry Training Committee?) who designed a training course for the Driller's Assistant Traineeship Program and produced the Australian Drillers Manual. The drilling trainees are paid at 75% of the award rate during training and receive 13 weeks off the job training at TAFE. I feel that a similar scheme would be attractive to the Coal Industry and would boost the professionalism and effectiveness of drillers.

1996

In 1996, the following will be conducted:

- Continue the operators' and researchers' communication meetings, extending these meetings to mines in the Newcastle/Hunter Valley region,
- Interview drilling supervisors and technical managers to reassess their priorities,
- Monitor ACARP projects,
- Plan a seminar on Advances in In-seam Drilling Technology with Roger Wischusen (if approved by the Task Force) to be held early 1997 to communicate developments to coal industry management and engineers,
- Attempt to involve more management personnel in communication meetings,
- If required, extend the operators meetings to cover gas drainage and gas research.

JOHN HANES

18th January 1996.

95eoyrep