Outburst Research Direction

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Gas & Outburst Workshop

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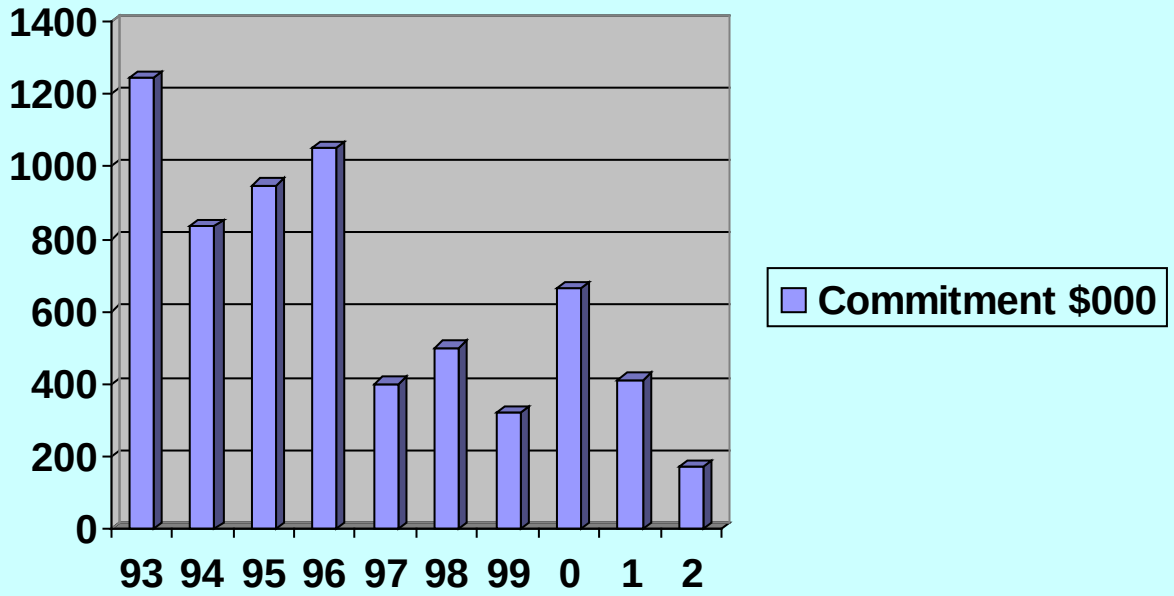
Purpose of Presentation

- Feed back from ACARP Underground Committee on Outburst Research
- Comment on Scoping Study by J.Hanes
- Discuss options for guiding future research
- Role for Industry Research Committee

ACARP's Role in Outburst Research

- Has been a priority topic for 10 years
  - See detailed listing in John's Scoping Study
  - $6.5m invested, incl gas drainage
  - NB: recent drop off



ACARP's concerns with OB Research

- R&D is reactive, non-integrated
- Research capacity reducing
- Some researchers becoming frustrated with lack of industry support
- Knowledge being lost as people leave industry
- Last OB symposium 1995
- Diminishing levels of urgency
  - a sense of complacency ?
- Notwithstanding John's seminars, not enough coordination and cooperation happening to drive new knowledge development

Commissioned Scoping Study to develop an Outburst R&D Strategy

Outburst Scoping Study

John Hanes 2003/04

Objective

- To develop, through **consultation with operators and researchers,**
  - a strategy for upgrading outburst management controls in the Australian Coal Industry,
  - including a **research plan** to support improved outburst management.
- In this context "upgrading" relates to **improving efficiency and effectiveness** of outburst control.

"An outburst is a sudden ejection of coal and gas, resulting from a release of stored potential energy"

Scoping Study Process

- a survey of mines currently using gas drainage and/or Outburst Management Plans;
- a survey of mines, mining technical staff, researchers, consultants and government personnel, regarding their perceptions of the needs for research, development and application;
- an Outburst Research Needs Workshop, attended by 20 invited operations leaders, regulators and researchers;
- discussions with experienced individuals; and,
- a synthesis of findings into a series of recommendations.

Current Status of Outbursts

- Outburst Workshop 1995, follow-up textbook
- Wold & Choi modelling
- 370km of inseam drilling per year = $37M
- 5 Recent Outbursts:
  - West Cliff longwall (2)
  - Central fault
  - Appin dyke
  - Tower remote mining
- Understanding of outbursts mixed
  - relying on gas content only is poor science
  - Kidybinski ('99)concerned at gas content thresholds and no peak advisory body

Outburst Workshop Issues

- Current protocols misleading outside Bulli seam?
- Limited fundamental basis for current protocols
- Are barrier sizes appropriate?
- Some O/B parameters not appropriate
- Need better understanding of OB mechanism
- How to drain tight coal
- How to drain stressed/broken coal
- Ambiguity re structured coal
- How to confidently locate structures
- Data acquisition imprecise & inefficient
- Poor predictive systems
- Insular approach
- Training & awareness inadequate

Outburst Workshop: Requirements for next 5 years

- Validated and agreed understanding of mechanism
- Tools to rapidly reduce pressure gradient
- Tools to ID zones of OB proneness
- Better means to negotiate high risk zones
- High confidence in defining structures
- Tools to easily measure pressure gradients
- Understand discrimination of structure size/nature
- Develop permeability enhancement tools
- Develop methods to drill & drain in tight/stressed coals
- Routine use of inseam geophysics

Outburst Research Goals

Outburst Research Goal 1:

Review and specify the outburst mechanism and the roles of the various parameters. The parameters must be practically measurable. Once the researchers have defined the mechanism, it will have to be communicated to all players.

Outburst Research Goal 2:

Understand the (structural) conditions which cause zones of poor drainability or drillability and therefore, increase outburst proneness, and to confidently locate these zones with adequate response time

Outburst Research Goal 3:

Develop and apply tools (methods) to rapidly, efficiently, and preferably economically reduce gas content/pressure as a routine and as a last resort.

PLUS..... Awareness development

How to Achieve Goals ?

- Use developed tools
  - need to be tested, commercialised
- Mines must get involved in research:
  - collect and share basic data
  - use CSIRO model
  - encourage post-grads
  - define a research program
  - de facto research mines ??
- Improve communications & awareness

Research Plan - Trials

- **ACARP to monitor progress with:**
  - Monitored DHM rigs
  - Monitored rotary drilling for structures
  - Trial coring of face holes
  - Drill fluid logging
  - Development of Gas Database
  - Automated gas flow monitors
  - Borehole pressurisation system
  - Rotary torque/thrust survey tool
  - Dielectric tool
  - Gas pressure gradient measurements

Research Plan - Parameters

- Rapid gas index
- Gas composition change
- Violence - CO_2 and CH_4
- Barrier Zones
- Permeability
- Coal strength
- Stress
- Structure
- Training

❑ *Propose total spend $3m over 7 years*

What should we do ?

- Establish a centre of excellence to focus effort
  - UNSW – Ventilation Centre ?
  - find Assoc Professor to run R&D program
  - fund with direct industry support plus ACARP commitments
  - attract post-grads
- Establish steering committee to oversee program
- Establish awareness & training program
- Focus on 1 or 2 mines as “experimental” centres
- Commission a coordinator to manage trials and workshops

Steering Committee

- **Members of industry with interest, experience and ability to provide guidance and governance of program:**
  - Similar role to LASC
  - Spend time and effort to develop clear guidelines
  - Work with potential researchers to develop a viable R&D plan
  - Provide linkages between stakeholders
- **Involve relevant representation:**
  - NSW, Qld
  - Operators, Technical, Regulators, Researchers
- **Two roles:**
  - Research direction and knowledge dissemination
  - Advice to ACARP (and others?) for funding

Challenges

- Form a useful committee that can meet regularly
- Develop clear goals
- Identify the capable and interested researchers
- Build an investment case and formulate a suitable Research Plan
- Obtain industry support incl. ACARP
- Facilitate establishment of Centre at UNSW
- Establish network with relevant stakeholders, incl OS groups
- Attract new people into the field