Case study: Safe mining of an outburst-prone coal seam – Australia

Initial conditions*:* Over 700 outbursts of coal and gas involving carbon dioxide and methane in varying mixtures had been recorded in Australian mines since 1895, some causing fatalities.

Problem*:* A particularly problematic outburst prone seam was the Bulli which was being worked by a number of mines in New South Wales (NSW). Since the first recorded outburst around 1895 there have been 12 fatalities resulting from outbursts. Following an outburst-related fatality at South Bulli Colliery in July 1991 a number of industry working groups were formed at the initiative of the mines inspectorate to examine the risks. The analysis led to the introduction of the concept of Outburst Management Plans (OMP). Application of OMPs proved patchy and an outburst-related fatality at Westcliff Colliery in 1994 highlighted the need for a more stringent approach. The procedures that were successful in high methane areas have failed in some mines to produce positive results in high carbon dioxide areas. Concentrating coal production on fewer high production longwalls demanded faster heading development rates. In this situation it was essential to control outburst and gas emission risk to maintain the viability of mining operations.

Solution*:* The NSW mines inspectorate sought to address the deficiencies by issuing a practical guide which explained to mine management how to develop and implement a rigorous outburst management system. The need for this approach is reflected in the following statement from the Outburst Mining Guideline (Department of Mineral Resources, NSW, 1995):

"*The extensive experience of the Coal Mining Inspectorate in the investigation of outburst events has shown that a degree of certainty is often lacking in knowing that procedures intended to be undertaken are, in fact, undertaken. In other words, it has become apparent that the management of outburst risk is at least as much a managerial and control issue as it is a technical issue. The best technology available has often been found wanting in the absence of effective systems to control its application*".

The Outburst Management Plan (OMP) must describe responsibilities, procedures and protocols to facilitate safe working. The outburst management process involves analysis of seam gas content monitoring, geological structure and results of in-seam drilling. Gas drainage is the principal prevention mechanism by reducing gas contents in the worked seam below a threshold concentration considered as the minimum to pose an outburst risk (Lama, 1995). Procedures for mining under outburst conditions are implemented when it becomes apparent that no further mitigation is possible or further drilling will not provide meaningful additional data. Outburst mining procedures are designed to minimise the exposure of workers to the hazard and to provide emergency protection facilities in the areas at risk.

Subsequently, coal mines in Australia have demonstrated that with effective management systems in place outburst prone seams can be mined safely and profitably.