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SEALING OF GAS BORES



TEAM VALUES

Safety | Integrity | Collaboration | Determination | Passion for improvement | Responsibility and accountability

Company Profile

Dynaciv is the culmination of many years of experience in the application of various epoxy resins to strengthen structures. We have learnt how to adapt epoxy compounds to specifically suit the purpose to improve quality and increase value.

We pride ourselves on our technical expertise and how it knits well with the practical experience we have gained working on large underground infrastructure projects to the smallest repair project.

The Situation



Top of the leaking gas bore

Early in 2011, two gas bores were drilled to a depth of 900 m targeting coal seams. At the time, the bores were plugged using three separate cementitious plugs between the terminal depth and the surface.

The drill site area was scheduled for rehabilitation a few weeks after the concreting. However, at the commencement of the rehabilitation, a gas emission was noticed at one of the bores. After conducting several tests, it was determined that methane was escaping from the bores. The source of the gas could not be identified, but one of two discrete gas reservoirs was thought to be the source.

One of the bores was then re-drilled to a depth of 200 m and re-concreted however, this did not solve the problem.

An in-depth investigation yielded sufficient evidence to attribute the gas emissions to micro-channels between the cementitious plug and the bore lining.

The Solution

Dynaciv was contacted to design a system that would seal the bore and eliminate any further gas emissions.

The proposed solution required the bore to be cleaned out/drilled to a depth of 1 m below the surface. This would provide an adequate bond area for the epoxy seal.

A pre-manufactured steel collar and cap fitted with an air coupling was welded onto the bore as shown in the picture below.



Well collar before welding

The collar was then filled with a formulated adhesive epoxy. This special blend produced by Dynaciv is formulated to maximise adhesion and generate low exothermic heat. Once filled, the valve was closed, and the collar pressurised to 500 kPa.



Collar cap with closed valve and air inlet



Collar cap, closed valve and airline



Pressure of the vessel

The pressurised collar was allowed to stand for 24 hours while the epoxy cured. The air pressure would force the epoxy into the micro-channels through which the gas was leaking.

After 24 hours, the pressure was slowly released from the collar. Once the collar was completely depressurised, the valve was opened to inspect the epoxy. A gas monitor was used to detect any leaking gas.



Collar cap, open valve and surface of the epoxy



Close-up of the collar cap with the valve and air inlet removed

(Notice that the collar is now filled with epoxy)

If the level of the epoxy had dropped significantly during the pressurising process, the procedure would have been repeated until the epoxy maintained its level.

After the valve and air inlet were removed, the epoxy was topped up and the screw-on plugs were fastened.



Closed bore cap

Benefits

The benefits of using this system to rehabilitate gas bores are significant. The costs of incorrect bore rehabilitation can exceed \$1 000 000, along with unnecessary environmental damage and upset to the stakeholders. If planned correctly and written into the rehabilitation process, the sealing of bores using an epoxy compound is relatively inexpensive. This process can guarantee a zero leak in any gas bore.

The specialised epoxy blend formulated by Dynaciv has many benefits over similar cementitious systems.

The benefits of using this epoxy are:

- low viscosity to fill micro-channels
- controlled cure rate
- excellent adhesion
- environmental compatibility (non-reactive once cured)
- ability to be pressurised
- zero shrinkage (formulated by Dynaciv).