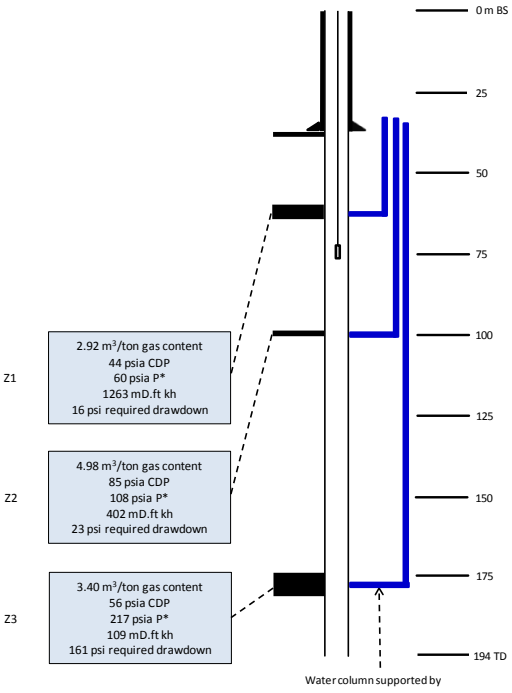
APPLICATION REMIT

GasMapper Testing Solutions

CONCURRENT GAS CONTENT AND PERMEABILITY TESTING



Challenges

Coal plays an important role as the primary source of energy for the generation of electricity worldwide. However, the coalification process that converts plant matter to fuel also produces methane and carbon dioxide gases. When mining coal underground, release of those gases poses serious safety challenges through two mechanisms – outburst and explosive gas.

Need

Underground coal mine operators therefore need fast, cost effective and accurate data regarding distribution of gas and permeability in coals targeted for mining, and in surrounding coals, so that they can:

- Ascertain whether a particular coal requires gas pre-drainage prior to mining
- If a coal requires gas pre-drainage, plan appropriate well types and spacing's to dewater and drain the seam quickly and effectively
- Map where gas occurs in a target coal field so that pre-drainage operations can focus on high gas areas
- Accurately predict gas pre-drainage time required before underground mining can commence
- Accelerate new coal mine exploration by reducing dependence on drilling rigs
- Prove that pre-drainage operations comply with regulatory requirements before drainage commences

FEATURES & BENEFITS

- Revolutionary combination of Australian innovation and American invention
- Significantly reduces exploration costs and time
- Downhole measurements using proven testing methods
- Trialed successfully with some of the largest coal miners in the world

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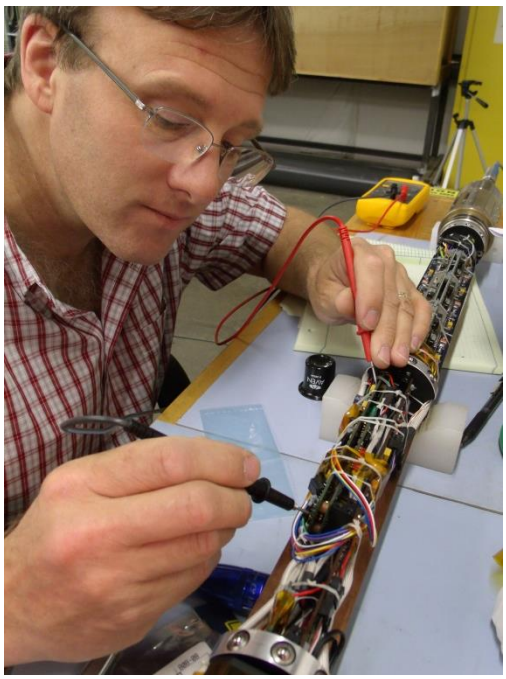
FEATURES & BENEFITS
continued

- Can be performed in chip holes – no core hole needed
- 33% fewer drilling meters means 33% less drilling costs – and 33% less exploration time
- Widely accepted by coal seam gas auditors, enabling mine to book gas assets if desired
- Does not require supporting on-site laboratory, so suitable for remote locations
- Also measures carbon dioxide, if desired
- Avoids data uncertainty associated with *ex situ* and rock-based measurement techniques
- Coal mine safety experienced service provider
- The only testing method auditable for accuracy
- Tests shallow and deep seams



- Reduce new coal mine exploration costs related to drilling by 33%
- Rely confidently on reservoir gas data that is not compromised by ex situ measurement challenges or coal seam geological heterogeneity
- Quickly obtain more accurate and more representative data to increase underground coal mining safety

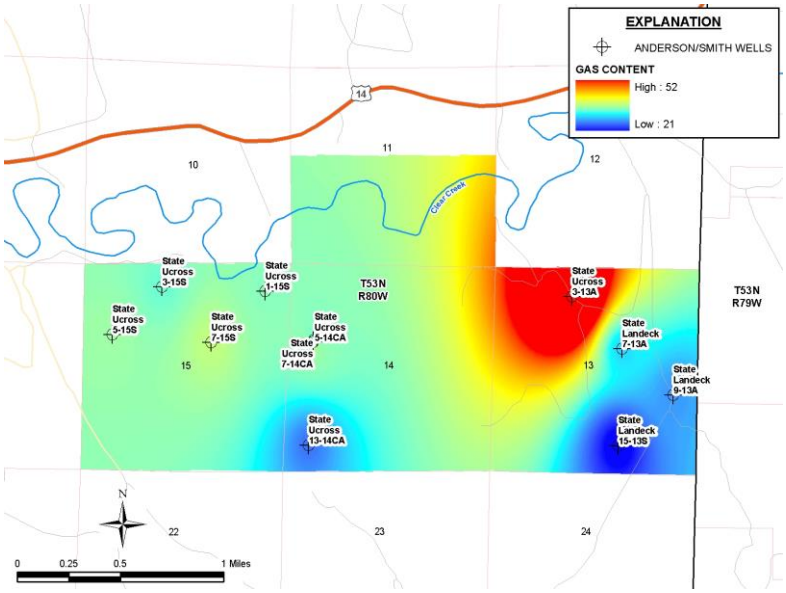
Solution
Determination of Gas Content and Flow Capacity in Chip (PQ) Holes

The problems of discrete measurements, accuracy limitations and cost constraints associated with the traditional coring and flow capacity testing in dedicated HQ holes is overcome using WellDog's *GasMapper* testing service. This combines WellDog's proprietary Reservoir Raman Spectroscopy with standard open hole drill stem testing technology.

The *GasMapper* system performs direct laser based measurements of solubilised methane gas concentration in the water extracted from the coal seam cleats during flow capacity tests conducted downhole, using WellDog's *PermMapper* drill stem testing technology.

The measured methane gas concentration is equated to a partial pressure of methane, which can then be equated to coal gas content using appropriate Langmuir isotherms values.

The *PermMapper* system features a reset function, allowing flow capacity of multiple seams in the same well to be determined in a single trip. In this way, a stratigraphic map can be generated, with accurate gas content and flow capacity data attributed to each seam quickly, in a single trip, in the chip (PQ) holes, thereby eliminating need for many of the dedicated HQ holes, and associated additional costs.



This revolutionary test can be performed in PQ-sized chip holes, so no additional drilling is required to measure coal gas content and permeability.