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**ABSTRACT**

**Defining geological and hydrogeological conditions to optimise resource assessment and mining lease compliance for UCG**

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A range of geological and hydrogeological parameters impact both resource potential and environmental risk associated with Underground Coal Gasification (UCG) operations. As in conventional coal Resource definition reliant on an estimate of assumed and justifiable technical, economic and development conditions, site determination for UCG prospects requires careful characterisation of coal parameters within its host environment as the most important starting point for Resource classification. These parameters typically include regional setting, coal seam stratigraphy and distribution, structural controls, coal quality parameters and diagenetic overprinting. For UCG, however, the technical and production related utilisation aspects of in situ coal require a modified approach to conventional Resource estimation. In particular, coal seam and host strata architecture and porosity/permeability, and coal seam composition will significantly impact UCG production modelling.

Additionally, UCG operations pose environmental risk common to Coal Seam Gas (CSG), conventional coal mining and unconventional petroleum resource extraction as well as those unique to UCG. Environmental management and UCG mine lease compliance may therefore be complex. Site selection, based on careful characterisation of geological and hydrogeological variables of the host environment is crucial to planning and management of environmental compliance. Understanding the dynamic interplay between pressure and temperature variation during UCG operation - and later shutdown and decommission – and host environment (coal seams and adjacent and overlying strata) needs detailed characterisation of site geology and hydrogeology along with appropriate real-time monitoring. Many aspects of risk-mitigation relate directly to the siting of a UCG project and the geological and hydrogeological aspects of potential settings are here highlighted in the context of risk-mitigation.

Characterisation of the geological and hydrogeological setting of potential Resources therefore satisfies both resource assessment and approval and management conditions for a UCG project.