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Groundwater Baseline Monitoring at Underground Coal Gasification Sites in South Africa

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The use of underground coal gasification (UCG) technology to extract synthetic gas from coal, deemed to be uneconomical to mine could be a solution to ensure national energy security in South Africa. Recent changes to the Mineral and Petroleum Resources Development Act (MPRDA), included regulations for governing the application for and awarding of prospecting rights and mining rights for UCG.

In light of these developments it has become increasingly important to understand the baseline groundwater conditions of a UCG site prior to operation as more interest grows in development of UCG as an alternative to conventional coal mining. This paper establishes a methodology for collecting defensible baseline datasets to which any changes in water quality at operational UCG sites can be compared.

The approach to be selected for the baseline monitoring has to be site specific and based on the Hydrogeological Site Conceptual Model (SCM) of the site. Therefore, the baseline monitoring approach will include extensive field investigations to construct and add the required detail to the SCM and will include (but not be limited to) the following aspects:

- Definition of aquifer systems with specific constructed boreholes to represent each aquifer system.
- Selection of target chemical parameter list should be representative of the groundwater quality and the potential by-products of the gasification process.
- Piezometric levels of all aquifer systems.
- Sampling techniques need to be fit for purpose and analytical parameters, and may need to include both passive and active sampling techniques.

The proposed methodology is compared to field results obtained during baseline monitoring at various South African UCG sites which highlight the differences and shortcomings of collecting baseline data from conventional coal mining projects.

