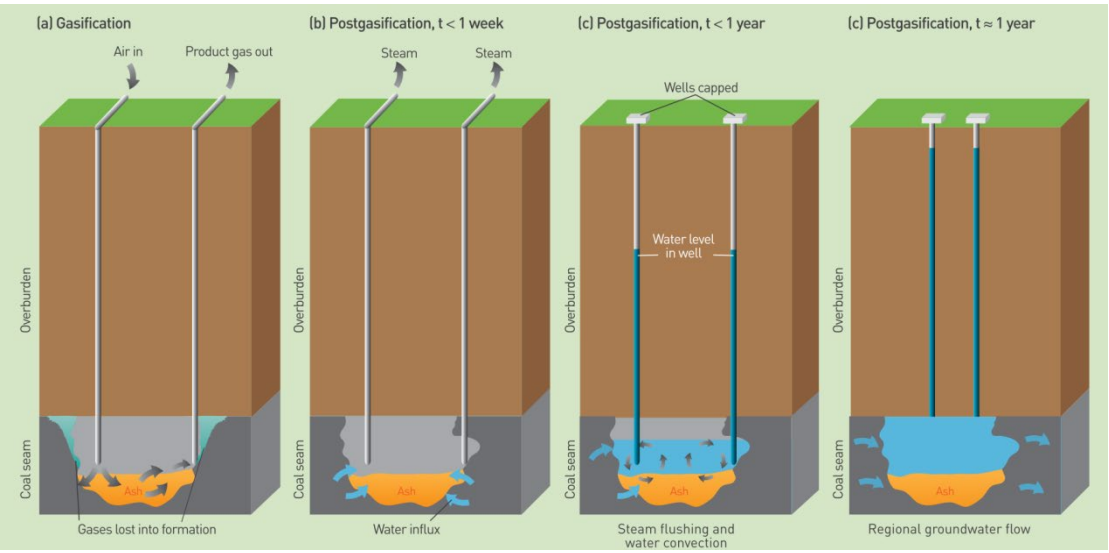
PROJECT FINDINGS

UCG environmental risks minimized - effect of gasification conditions

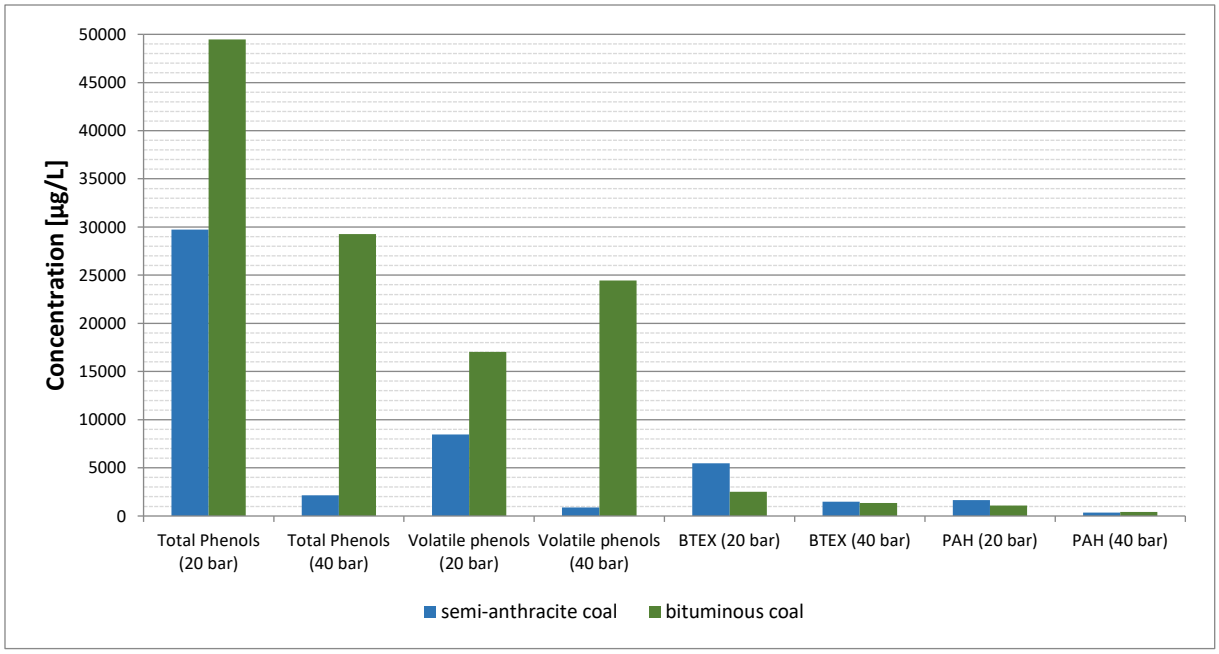
With regards to underground coal gasification process, there are two key items in analysis of groundwater impacts, namely the potential risk of groundwater contamination and the likelihood for depletion of regional groundwater reservoirs in the vicinity of the UCG site. Pollution of groundwater, however, is considered to be the most serious possible negative environmental impact. The UCG operation is inevitably related to the formation of hazardous environmental contaminants as a result of the many heterogeneous and homogenous reactions that occur in the oxidation, reduction and pyrolysis zones that develop along the gasification channel. These toxic substances can be introduced into the groundwater at different phases of UCG, i.e. both during the UCG operation and in the post-UCG phase.

The major organic groundwater pollutants are typically phenolic compounds. In addition, benzene (with alkyl derivatives, (BTEX)), polycyclic aromatic compounds (PAHs) and N-heterocyclic compounds are the next groups of organic compounds that are characteristic contaminants from the UCG. In the inorganic content of groundwater affected by UCG, the dominant contributions are from ammonia and typical ionic compounds, such as sulphates and chlorides.



Potential mechanism for groundwater contamination due to UCG operation (Linc Energy, 2010c)

The studies conducted in the MEGAPlus project revealed that the type of coal used and gasification pressure have a significant impact on the wastewater parameters. The conducted studies on the gasification effluents revealed significant relationships between the physicochemical composition of the wastewater and the coal properties as well as the gasification pressure (see figure below). The higher gasification pressure reduces a total amount of organic contaminants produced and therefore the environmental risk under the elevated pressure may be significantly minimized.



Average concentrations of phenols, BTEX and PAHs in UCG wastewater depending coal type and gasification pressure.

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