Report of May 2012 Meeting
Royal Society
Southern Highlands Branch

Speaker: Associate Professor Bryce Kelly

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Topic: Coal Seam Gas (CSG) What Does Science Tell Us About The Impacts?

Billions of dollars have already been spent on the development of Coal Seam Gas (CSG) exploration and infrastructure development. Extracting the gas from coal will clearly be part of our future in Australia, particularly in New South Wales and Queensland. If mistakes are made in extracting the CSG, then there are good reasons to be concerned about the resulting environmental impacts. These include groundwater contamination, aquifer interference, small earthquakes and contribution to greenhouse gases.

Bryce Kelly described how at each CSG production site there will be different impacts, depending on the manner in which the coal at that location has been formed. He gave examples of a variety of processes of coal formation. For example the black Permian coals in NSW and the Bowen Basin in QLD were formed 300 to 250 million years ago, where plate tectonic movements resulted in crustal extension along the now eastern portion of Australia. As the land subsided, large basins formed and extensive cold climate peatlands developed. The Walloon seams in QLD however are Jurassic (200 to 145 million years old) and formed in lakes surrounded by humid tropical forests. Locally the coals in QLD underwent very different processes compared to those in NSW.

CSG is produced by the technique of hydraulic fracturing (fracking), which involves injecting water, some sand, and small quantities of additives into the well under extremely high pressures. The water helps to expand the fractures in the coal seams and deliver the sand and chemicals. The grains of sand help to prop open the fractures and improve the longer term capacity to extract gas.

The fracking chemicals or additives used depend on the company, local laws and the geological setting. Most CSG companies list major fracking fluid constituents on their websites. Additives used include acids, salts, gelatine and enzymes. These chemicals help change the surface tension between the gas and coal substrate, enhance the viscosity of

fluid movement along the fractures, dissolve minerals in the fractures, stabilize the clays and prevent corrosion. Depressurisation should draw the fracking chemicals towards the production well. Bryce Kelly noted that should any of these additives leak into adjacent aquifers, then the longer term ramifications are not yet known. He did add however that scientifically validated cases of fracking chemical contamination of groundwater due to shale or coal gas production are very rare.

Earthquakes too can be caused by injection techniques similar to those used in the fracking process. Kelly emphasised the management implications required in these situations, namely continuous seismic and borehole stress measurements near CSG developments that are close to residential areas.

The large audience of ninety was clearly pleased with the presentation which was objective and highly informative, without the usual overtones of emotion and politics that so many of them had experienced in recent local rallies in the Southern Highlands. They had been presented with the view that CSG is a very acceptable source of energy for the future, provided the development of management techniques and scientific research into the process are ongoing.

Anne Wood