



INDEPENDENT SCIENTIFIC PANEL

FRACKING ENQUIRY SUBMISSION

FEBRUARY 2018

1 BACKGROUND

The Western Australian Government has established an independent scientific panel to consider the risks of fracking. This submission is prepared by Phil Wharton a Principal of Rockwater and represents his opinions and not necessarily those of other Rockwater directors and shareholders. Mr Wharton has more than 40 years' experience as a professional hydrogeologist, mostly in Western Australia.

Rockwater has previously been engaged professionally, as hydrogeologists, to assess potential impacts on groundwater of oil and gas exploration and development activities, including fracking, by Buru Energy, AWE Limited, and Transerv Energy/Latent Petroleum for projects in the Canning Basin and northern Perth Basin. We have not been involved with any coal-seam gas projects

2 SUBMISSION

In my opinion there are two completely distinct types of fracking, and these must be considered separately when looking at risks:

1. Coal Seam Gas projects, such as have been developed extensively in Queensland; and
2. Fracking of deep reservoirs to produce oil or gas.

2.1 Coal Seam Gas Projects

At these projects, the coal seams which are fractured ('fracked') are generally at shallow depths, and are in hydraulic connection with overlying aquifers. Water levels in the aquifers have to be lowered to release gas from the coal seams. As a result, there is often wastage of valuable groundwater resources, and there is a moderate or high risk of groundwater contamination from drilling, fracking and formation fluids; and from, for example, the oxidation of sulphides associated with the coal seams. Oxidation of sulphides has the potential to cause acidic conditions and the mobilisation of metals.

In Western Australia there are few areas that have shallow coal seams – Eneabba, Collie, and east of Margaret River.



2.2 Deep Oil and Gas Reservoirs

These reservoirs are usually at depths measured in kilometres, with large thicknesses of rocks of very low permeability lying between the oil or gas reservoirs and any overlying aquifers. For example at Valhalla, 145 km south-east of Derby, the reservoirs are about 3 km deep, and are overlain by about 2 km thickness of rocks of very low permeability (Anderson Formation), which provide large separation between the reservoirs and overlying aquifers

It is extremely unlikely that any introduced or natural formation fluids would move vertically through the many layers of fine-grained, very low permeability rocks. This is shown by the confinement of hydrocarbons within the reservoirs for millions of years. Also, the impacts of reservoir stimulation have been shown to extend only several tens of metres, and so would not result in flow pathways to shallow or deep aquifers.

The most likely potential sources of groundwater contamination are:

- Fuel or other chemical spills at ground surface;
- Leakage from water storage dams; and
- Upward leakage via an oil or gas well, if the well was poorly constructed.

If correct procedures are used, upward leakage is precluded by the use of multiple casing strings, grouting between the casings, and checking of well integrity to meet Department of Mines Industry Regulation and Safety specifications and regulations.

From our experience, the petroleum companies have rigorous monitoring programmes that are designed for early detection of any spills or leaks so that they can be cleaned up.

3 CONCLUSIONS

The two different environments where fracking is employed must be considered separately.

Coal seam gas development does have significant risks due to the close proximity of coal seams and aquifers; and groundwater is often unproductively consumed in reducing hydraulic pressures on the seams.

Conversely, there is negligible risk in fracking of deep oil or gas reservoirs, due to the large thickness of very low permeability rocks between the reservoirs and overlying aquifers. Fracking has been standard industry practice for many years, and to my knowledge has not caused any groundwater contamination in Western Australia. There is a small risk of formation fluids or fracking fluids moving upwards via well casings or annuli, but this risk is mitigated by multiple casing strings, grout seals, and well integrity tests. The most-likely risk is leakage from water storage dams, or spills at the ground surface. There are similar risks at many industrial and mining projects.

Dated: 8 February 2018

Rockwater Pty Ltd

A handwritten signature in blue ink, appearing to read 'P H Wharton', is centered on the page. The signature is fluid and cursive.

**P H Wharton
Principal**