Submission to: Independent Scientific Panel Inquiry into Hydraulic Fracture Stimulation in Western Australia 2017

A number of rigorous and, highly qualified reviews of unconventional gas have been compiled – i.e. Vogwill, (2017); Cook et al., (2013). I submit this information with a focus on hydrogeology. Points of concern are listed below, followed by proposed idea(s) to potentially address the concern.

- Common theme of general lack of baseline studies into site hydrogeology, ecology and heritage values, to provide robust understanding of site conditions fundamental to impact assessments.
    - Strict regulatory requirements for appropriately high levels of assessment confidence (i.e. based upon a minimum of 12 – 24 months robust data with demonstrated, verified and replicable results) should be imposed. Particularly crucial in areas with sparse or non-existent prior data or study.
- I believe unconventional gas will require an increased level of stringent, and active, regulation.
    - Key idea presented by Vogwill (2017) is that of unconventional gas proponents legislated to provide financial levies, such as done for the Mine Rehabilitation Fund, to support and ensure independent, long term monitoring and rehabilitation of onshore unconventional gas projects by an independent (preferably regulatory) body. Levies would entail a far higher sum than the MRF given the high level and irreversible nature of potential impacts, as well as the high potential cost of works to remediate/repair well failure.
    - Independent (regulatory) body should be resourced to allow individual project assessment; regular inspection and independent data collection for verification; continuous groundwater modelling assessment; legislative power to stop production/rescind licences and force remediative works to stringent standards, defined by clear quantitative triggers in regulatory policy.

- Vogwill (2017) highlights the study by Davies et al. (2014) which concluded that it is not possible to have zero percent chance of well integrity failure:

  "Davies et al. (2014) reviewed only reliable databases of well integrity from around the world and found that failure rates were highly variable from 1.9 to 75 per cent, with the Marcellus Shale well failure rate at 6.3 per cent, for example."

- In addition, the well integrity can only be expected to decline with age. As such it must be considered in all risk assessments that well failure is a possible to highly likely occurrence, increasing with time. Potential impacts would range from medium, and manageable, to catastrophic impacts that are irreversible.

    - Stringent and strict requirement for baseline studies and impact assessment confidence based on robust 12+ month data; strict impact assessment criteria, milestones and requirements for approval; comprehensive operational monitoring and reporting requirements; post-decommissioning liability.
    - Independent body is crucial to ensuring adequate assessment of cumulative impacts by keeping a complete register of all onshore wells. This would be particularly crucial to identify cases of new well developments within potential range of

influence on decommissioned, failed or historic wells with higher potential of failure leading to groundwater contamination.

- Given potential irreversible magnitude of impact, the precautionary principle demands that it is unacceptable for any unconventional gas well to intercept, underlie or connect any aquifer drawn upon for a drinking water source. Strict regulation would be critical to defining such non-feasible areas for unconventional gas development – i.e. significant water resources.
- Contamination of water resources fit for agricultural or domestic use should carry $/L regulatory fine in addition to regulator order of remediation and ceased production.

Thank you for undertaking this Inquiry and please do not hesitate to contact myself on the details provided should you have any questions regarding the content of this submission.

References

Cook, P, Beck, V, Brereton, D, Clark, R, Fisher, B, Kentish, S, Toomey, J and Williams, J (2013). Engineering energy: unconventional gas production. Report for the Australian Council of Learned Academies, www.acola.org.au.

Davies, R.J., Almond, S., Ward, R. S., Jackson, R.B., Adams, C., Worrall, F., Herringshaw, L., Gluyan, J. G., and Whitehead, M. A., 2014, Oil and gas wells and their integrity: Implications for shale and unconventional resource exploitation, Marine and Petroleum Geology, Vol 56, pp 239-254.

Vogwill, R., 2017. Western Australia's Tight Gas Risk. Conservation Council of WA.