**From:** Naomi Hogan
**To:** fracking inquiry
**Subject:** Suplimentary submission from NT Lock the Gate Alliance
**Date:** Tuesday, 29 August 2017 12:47:18 PM
**Attachments:** Sup submission from LTG NT re Inquiry qns August 2017.pdf

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Hi Fracking Inquiry task force and Panel,

Please find attached a further submission that responds to questions from the Inquiry Panel and Chair of Lock the Gate. It also includes recommendations for going forward.

I trust the relevant sections will be made available to the most appropriate panel members for the drafting of the Final Report.

Warm regards,

Naomi

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Naomi Hogan

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Lock the Gate Alliance
28 August 2017

To the Chair and Panel,
NT Fracking Inquiry

**Re: Supplementary submission for NT Lock the Gate Alliance**

Thank you for the opportunity to provide further feedback to the Inquiry.

# Water

### Roper River and Karstic Systems

Further research into the Roper River and the recharge areas is necessary. Its headwaters are groundwater. The groundwater recharge catchment is therefore extremely significant to the Roper River.

The importance of travel times of contaminants in karstic aquifers (such as those found sourcing the Roper River and Flora River) also requires further information.

Here is the link to the 1998 report is from the Katherine River karstic system that I discussed at the Public Hearing:
http://www.territorystories.nt.gov.au/bitstream/10070/228574/1/WRD05022.pdf

Here, researchers looked at travel times of a dye tracer to move approximately 2.8 km from a sinkhole to the Katherine River. The dye was detected after only 3 days (almost 1000meters per day) at one spring in the Katherine River.

This work shows how quickly contaminants can move in a karstic limestone environment. Further research is required and an exclusion area for the headwaters of the Roper River need to be considered carefully from a quality and quantity perspective. The same can be said for all the karstic systems across the Northern Territory.

### Water Recycling

Water use and water recycling figures require greater scrutiny. Origin is talking about a 95-100% recycle rate (not based in any examples they have achieved before). Important context is that they only retrieved 18% of what they lost down the well at Amungee Mungee. Even if they reached their target 30% fluid recovery – the majority of water and chemicals are not being reused or recycled.

I also note that the Shlumberger water recycling reference is still not available online, noted in the Interim Report as Shlumberger Submission #321. Please make this available for public scrutiny.

**Surface Spills and Operating in the Wet Season**

Surface spills continue to be the biggest risk from shale gas activities, and operating in the wet season will only further expand those risks and surface water flows.

The fracking operations are not an entirely closed system. We disagree with the industry statement that, "Nothing in the wet season changes the risk profile of drilling and fracturing."

The lived experience of Territory residents in the wet season involves dangerous roads and crossings, soil movements, volatile storm conditions and road accidents. This could likely lead to increased risk of spills and overflowing fluid and chemical storage units. The proposed fracking sites are known to go completely underwater in the wet season, with black vertisol soils that shift, erode and become unpassable. The risk profile goes up for workers, and for those living downstream of the inevitable spills and accidents.

As this supplementary submission is written, media reports are only just coming to light from the flooding and storm events in Texas that are causing pollution events from oil and gas activities. For example, an Exxon oil refinery has been damaged by heavy rain and states that chemicals may now be released into the air:
http://money.cnn.com/2017/08/28/news/companies/exxon-refinery-baytown-harvey-damage/index.html

2016 flooding events in Texas also caused damage. *"Recent floods across Texas have inundated oil wells and fracking sites, flushing crude oil and toxic fracking chemicals into the state's rivers.*
*State emergency management officials have taken dozens of photographs that show sheens and plumes spreading from tipped tanks and flooded production sites during the March flood of the Sabine River on the Texas-Louisiana border."* See:
https://www.dallasnews.com/news/news/2016/05/01/texas-floods-washing-fracking-chemicals-crude-oil-into-rivers

**Flowback Fluid – Irrigation**

In reference to considering irrigation with produced waste water from coal seam gas mining in QLD, compared to flowback fluid from NT shale, it is important to note two key things:

1) Most of the coal seams that have been targeted so far in Queensland are in the Walloon coal measure, which is also a beneficial aquifer. This means that waste water quality there is completely different to that in many different areas of Australia, where the substrates that

are targeted are far deeper and brackish, non-beneficial. The relevance of waste water quality from QLD to NT is very limited. Further, the NT shale gas process always requires fracking (not the case in QLD CSG) and always require tonnes of chemicals to be injected down the well, some of which returns to the surface in the flowback fluid.

The ability to use reverse osmosis or other means to treat the heavily polluted flowback fluid from shale can be limited, depending on the composition of the flowback. Please see our previous submissions for concerns over flowback fluid composition, health risks, chemical use and waste water treatment.

2) There has been very little transparency or monitoring as far as we know re CSG waste water use in QLD. We've never been able to get any empirical data from the QLD Government, the Gasfields Commission or the CSG companies.

Further information about flowback fluid from shale can be found a range of publications.

For example, a recent 2017 peer reviewed study in the Marcellus Shale region of western Pennsylvania has shown that even after being treated, wastewater from hydraulic fracturing operations left significant contamination in a waterway downstream of treatment plants. Researchers from Penn State University, Colorado State University, and Dartmouth College studied sediments from Conemaugh River Lake — a dammed reservoir east of Pittsburgh — and found that they were contaminated with endocrine-disrupting chemicals: nonylphenol ethoxylates; polycyclic aromatic hydrocarbons, which are carcinogens; and elevated levels of radium.

Full report: Watershed-Scale Impacts from Surface Water Disposal of Oil and Gas Wastewater in Western Pennsylvania
William D. Burgos, Luis Castillo-Meza, Travis L. Tasker, Thomas J. Geeza, Patrick J. Drohan, Xiaofeng Liu, Joshua D. Landis, Jens Blotevogel, Molly McLaughlin, Thomas Borch, and Nathaniel R. Warner
*Environmental Science & Technology* 2017 *51* (15), 8851-8860
DOI: 10.1021/acs.est.7b01696
Available at: http://pubs.acs.org/doi/abs/10.1021/acs.est.7b01696

Other papers of interest:
Souther S, Tingley MW, Popescu VD, Hayman DTS, Ryan ME, Graves TA, Hartl B, Terrell K (2014) Biotic impacts of energy development from shale: research priorities and knowledge gaps. Frontiers in Ecology and the Environment 12, 330-338. Available at http://onlinelibrary.wiley.com/doi/10.1890/130324/abstract

Papoulias DM and Velasco AL (2013) Histopathological analysis of fish from Acorn Fork Creek, Kentucky, exposed to hydraulic fracturing fluid releases. Southeastern Naturalist 12, 92-111. Available at http://www.eaglehill.us/SENAonline/articles/SENA-sp-4/18-Papoulias.shtml [Verified 8 February 2016]

**Flowback Fluid – Waste Disposal**

With recycling, irrigation and aquifer injection cannot deal with the full account of NT shale flowback fluid. Therefore, decisions about the risk profile of the industry cannot be adequately assessed until we have a clear understanding of the plan for the waste products.

We would like to see a detailed and enforceable plan for the shale gas industry's waste in order to assess if this industry is fit to operate.

**Well integrity and fluid/gas migration**

The Panel would be well positioned to request the Wellsite Inspection Reports from the gas companies operating in Australia.

These reports are not publicly available. They are not made available to Government. However, their existence has been discussed by those that work for the companies and carry out the inspections. These reports outline the wells that are leaking, where licences have expired, or where there are well integrity issues documented. They would be useful reports for the Fracking Inquiry to access, if possible.

We have heard reports of a well integrity program, where all wells ranked, and comments that there is no active abandonment program. Possibly the Panel could request the data of the monitoring program from Santos and Origin, and request the details of all well leaks and valve isolation issues?

In terms of the gas wells and the outside of the gas wells posing a risk for fluid or gas migration, we think it is useful to further explore the likely pressure differentiation between the deep shale and the near surface aquifers. We need more information on what the pressures are, as fluids and gases move from high to low pressure if there is a pathway to do so. More information could be collected regarding the pressure measurements of other shale gas wells, before, during and post fracking operations, and how quickly pressure can build up again deep underground.

On listening to some of the other presentations, we wanted to make a few comments about the Origin Energy statements with regards to well integrity and the examples of water contamination in Pennsylvania.

We cannot find evidence to support the claim that there were "preemptive notices of well violation" given in that jurisdiction.

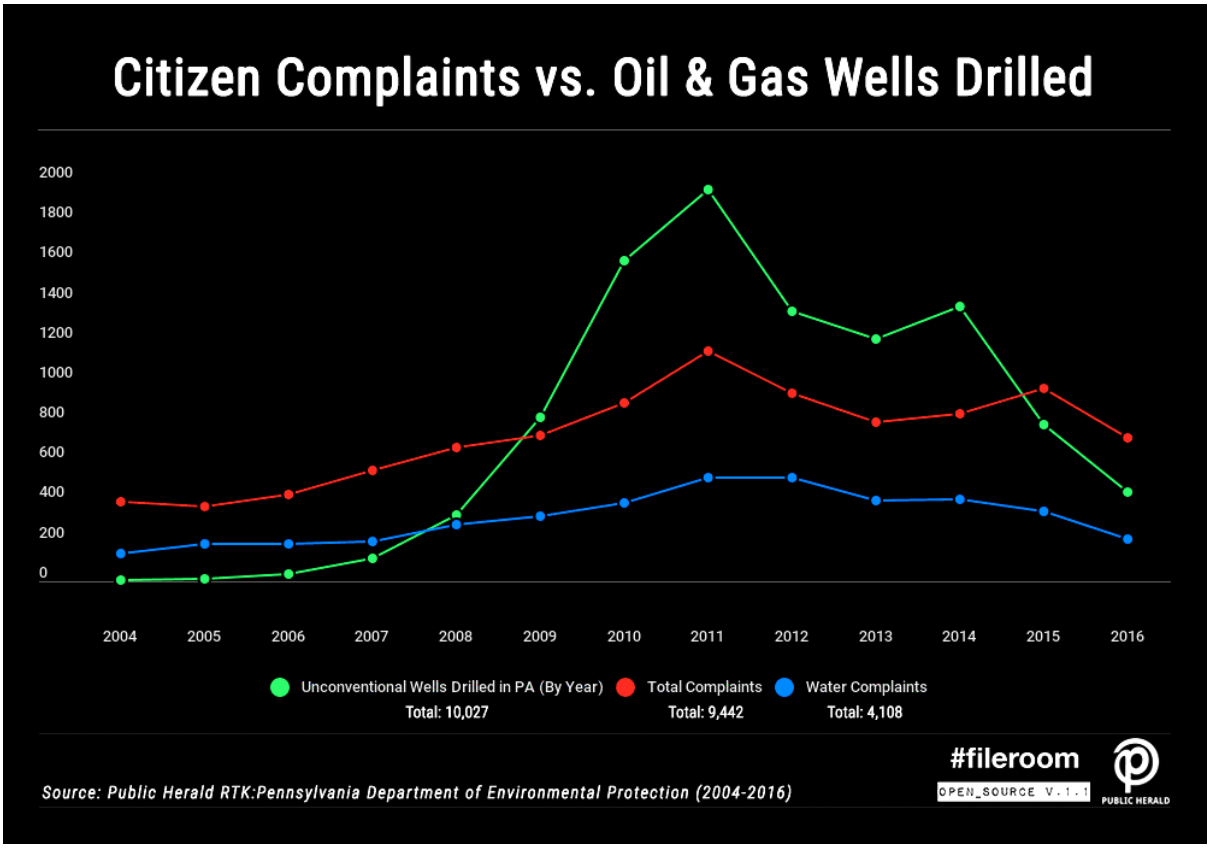
Researchers who contributed to the peer reviewed articles in relation to well integrity stated their basis was a combination of notice of violation and commentary by inspectors when no notice of violation was issued, even though the inspector observed leakage.

Further, all the drillers were not made to rectify through remedial work. Some of the drillers were "made to rectify", not all, and some that tried failed to rectify.

I have also rechecked the data in relation to the comments by Origin that since the Ingraffea data on well integrity only went to 2012 – and since the number of Notice of Violations declines year on year since then, “the problem is going away."

Here, the Origin representative is playing with statistics. The problem is not going away; rather *the number of wells drilled per year has declined drastically* every year since 2011. Fewer wells, fewer notice of violations.

Here is a chart that demonstrates the full figures, put together by independent journalists in the United States.




Full article available at: [http://publicherald.org/hidden-data-suggests-fracking-created-widespread-systemic-impact-in-pennsylvania/](http://publicherald.org/hidden-data-suggests-fracking-created-widespread-systemic-impact-in-pennsylvania/)

The number of complaints and the number of wells both decrease since 2011, but the ratio of complaints to wells drilled has actually drastically increased. So, the problem is not "going away", it is getting worse.

# Methane Emissions – Answers to Questions from the Panel

1. ***the technologies that are currently available to obtain baseline measurements of emissions, including the possible use of drones;***

Ensure top down as well as bottom up surveys are considered in order to calculate the likely emissions from gasfield infrastructure and activities for the Final Report.

Allow time for baseline collection to take place over multiple years and seasons, prior to any exploration activity taking place, in order to understand a true baseline. Hold this information in a publicly accessible place that can be used in legal proceedings and compliance information actions as appropriate.

Professor Isaac Santos from Southern Cross Univeristy has done some work in this space and would be worth contacting for further information. http://scu.edu.au/coastal-biogeochemistry/index.php/20

Seek comment from reputable Australian drone companies directly and find out what is currently available from that technology. For example: https://www.auav.com.au/about-us/.

AGL commissioned a report in relation to their CSG facility in Camden which may be of interest to the Panel: *Pacific Environment (2012), PRP U4.2 – Investigation of Best Management Practices and Monitoring Techniques – Scoping Review*. The report is listed as an attachment to AGL's submission to the NSW Chief Scientist review into CSG but the attachment wasn't uploaded: http://www.chiefscientist.nsw.gov.au/reports/coal-seam-gas-review/public-submissions. It may be worth contacting AGL directly if the Panel thinks this information would be helpful.

2. ***the scope, including the location, of any emissions monitoring that should occur during the exploration, development and production phases, such as, for example, wellheads during completion, liquids unloading, compressor seals and gathering stations;***

There is some useful evidence around where the key emissions sources are likely to be in this 2012 report by Saddler, Pitt & Sherry: Greenhouse gas emissions from gas production: http://www.abc.net.au/cm/lb/4418904/data/international-best-practice-for-estimating-greenhouse-gas-emiss-data.pdf

Monitoring must be independent and collect data at all likely pollution sources. Data must be made easily available to the public, in real time if possible. Data must be measured in comparison with a clear baseline. Monitoring should also occur across the surrounding landscape and interconnected waterways. The effectiveness of monitoring to prevent pollution and underpin compliance must be proven in currently operating gasfields elsewhere before it is determined to be a useful risk mitigation strategy in the Northern Territory context.

3. ***the use of emission limits that, if exceeded, would trigger an investigation, make-good requirements and/or a penalty;***

Given the likely natural variability in methane levels, this would need to be measured as a deviation from baseline rather than a fixed level, and refer to the isotopic composition, so there can be no argument about the source of the methane. This level could only be set after thorough, independent and transparent baseline analysis.

The ability, capacity and resourcing of any compliance team in the NT continues to be a concern, as does the culture of the EPA and other agencies to turn a blind eye to some pollution events, or offer fines that do not act as a disincentive to the proponent.

## On Chapter 14, Regulatory Reform

It is the opinion of the vast majority of Territory residents we hear from across the Lock the Gate network that the onshore shale gas industry should be banned from operating in the Northern Territory. Common concerns surround the risks of shale gas industry activities, the uncertainties regarding the Territory operating environment and impacts on water resources, and the poor track record (that continues to this day) with regards to regulation and compliance of mining and onshore gas operations in the Territory.

Further work is required to better understand what information is needed to assess the full risks to the Northern Territory. It is not possible to apply a risk assessment to an unknown risk. For example, the number of wells and the extent of the industry is important for estimating the likelihood of negative impacts occurring. Knowing groundwater/surface water interactions is important before estimating the consequences of such risks.

A precautionary approach therefore has to be applied and further work is required.

We suggest there is not enough information yet collected, and that until such a time as the information available, that aquifer regions and water catchments should continue to be protected from shale gas development, including exploration activities.

Further work is required to understand social licence to operate, and to explore methods of participatory democracy to work out if an area is appropriate for onshore gasfield development.

Many of the previously granted exploration licences are about to expire. This is a useful opportunity for the NT Government to reassess the proposals and to decide not to reissue exploration licences. Petroleum licences that have been issued without full information on the risks and impacts of shale gas production proposals should be relinquished. Only then could the Government start to rectify the legacy of exploration licence approvals and poor consultations to date.

This would encourage companies holding the licences to undertake proper consultation going forward. The potential issuing of a new exploration licence could be subject to a new set of landholder engagement laws, appropriate new upfront levies to go towards the high costs of attempting to regulate the industry's activities, and new independent baseline water studies that should be carried out before any exploration licences are reissued or rolled over.

Territory landholders continue to request the right to say no to shale gas operations on their land. Santos' recent comments about not wanting to provide capped opportunity for legal advice until just before the signing is further evidence of their disregard for landholders, their time and businesses. The complexity of risks and impacts will be borne by landholders in the short, medium and long term.

It offers little assurance that in the face of balanced suggestions for regulation going forward, both Origin and Santos are still pushing for as little regulation as possible, and are saying:

No well spacing rules
No veto rights for landholders
No pause to fracking development over the wet season

These three points are of large concern to the Territorians who live and work in these regions.

In order to be most useful to the Inquiry Panel in your deliberations, we have taken the time to include more detail around the types of regulatory improvements that we have investigated. These improvements include:

1) Legislate permanent no go zones for fracking over drinking water catchments, groundwater recharge zones and culturally and environmentally sensitive areas to protect these critical resources and values into the future.

2) Improve the Water Act with transparency on water use and water contamination, with enforceable water allocation limits for shale gas fracking.

3) Continue the moratorium on shale gas fracking activities until all scientific research, independent baseline data collection and information gaps identified by the Panel are filled and completed. This information could then be put before the Government and the Northern Territory community as the basis for a full consideration of the risks and operating environments, and new legislation could be tailored and enacted.

**Regulation recommendations for a Northern Territory Context:**

Reform the Petroleum Act reform to give landholders and native title holders the right to refuse access at the exploration and the production stage, and ensure stronger landholder

rights to negotiate access on their terms, negotiate water use, weed management, biosecurity, insurance, company bonds and a make-good provision.

Collect detailed independent and transparent baseline data over several years prior to any further unconventional gas exploration activities to better understand the operating environment, surface and groundwater interactions, groundwater quantity, pressure and quality, land use, and environmental and cultural values.

Detailed and independent Territory wide mapping of regional assets, water supplies, productive industries, tourism hot spots, aquifers and sensitive natural areas are required to help provide a snap shot of what is of significance to the Territory. These comprehensive maps must be based in detailed scientific and local economic information, and help set up legal protections and certainly for the productive industries that currently drive the Territory's economy.

Apply a comprehensive policy of insurance and environmental risk coverage for the shale gas industry before any further exploration activity takes place. This should include security deposits, enhanced insurance coverage and establishing an environmental rehabilitation fund.

The onus of proof must fall to the companies instead of the landholders – this is critical. This must be informed by independent baseline data that is publicly available and valid evidence in a court of law.

With regards to an overseer of regulation and industry works, we have serious concerns about capture of the QLD gasfields commission and the close role that the gas industry plays as part of the commission. It could be observed that the Gasfields Commission has tunnel vision and are only seeing the gas industry and not the broader context in which the industry is operating. Placing focus and value on the broader environment, social and economic operating systems would improve the current approach.

A truly independent expert standing committee or the like would be more useful, focussing on the scientific priorities for protection, instead of trying to provide gloss for the onshore unconventional gas industry.

Ombudsman for higher level powers of investigation – mechanisms that help it be immune from regulatory capture.

Allow community members to easily access information about what applications exists or exploration licences have been granted through an easy to use spatial data presentation, so that community members can more easily be informed to have a say about whether these licences are appropriate. For example, see the NSW system: http://www.commonground.nsw.gov.au/#!/

Amend the Petroleum Act to require decision makers to take into account cumulative impacts, or potential cumulative impacts of petroleum operations. This would include

particular consideration of the impact of emissions within an air shed[1], and the cumulative impact on the environment and human or stock health.

Apply full cost recovery to the industry for the cost of regulating shale gas, via fees, levies, royalties and taxes and deliver an annual regulatory statement to Parliament.
Insert third party appeal rights in relation to any permits or licenses granted under the *Petroleum Act.*

Put in place specific requirements to limit emissions as part of load based licensing conditions for VOCs, nitrogen oxides and benzene, while projects are operating under exploration licences.

Regulations or a Code of Practice[2], with legislative force, must be incorporated into the regulatory regime to provide for permissible standards of air quality. Regulation should provide enforceable measures for:

1. Fugitive emissions;

2. Ambient air-quality; and

3. Flaring.

Put in place a Well Integrity Code specifying requirements and recommendations for well design, casing, cementing, drilling fluids and abandonment into legislation. It must be clear what happens if these measures fail and how the ongoing liability to maintain the wells is enforced.

Require all shale gas industry personnel (including subcontractors) to have ongoing mandatory training and certification. This extends to public sector employees specifically in compliance, inspecting and auditing shale gas activities.

Legislate a reduction in chemical usage during hydraulic fracturing by including the use of ultraviolet light rather than biocide chemicals.

Include Mandatory Health Impact Assessments (HIAs) as part of the broader environmental assessment process. Please note that the use of a health impact assessment (HIA) is recommended as a key component of strategic environmental assessment by the World Health Organisation[3].

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[1] EDO NSW, 2012, Clearing the Air: Opportunities for improved regulation of pollution in New South Wales. http://www.edonsw.org.au/clearing_the_air_opportunities_for_improved_regulation_of_pollution_in_new_south_wales

[2][2] Regulations and Codes of Practice with specific requirements should replace the ambiguous and unenforceable requirement to act in accordance with 'good oilfield practice.

[3] http://www.who.int/hia/en/

Enshrine in legislation a robust and comprehensive policy of insurance and environmental risk coverage.

If any activities where to progress in future years, require public disclosure of all environmental management plans for all shale gas exploration and production activities, allowing for public comment periods, before approvals for exploration activities are granted.

Initiate a Territory-wide data depositary and online portal for easily accessible and up to date information on the works plans, chemicals proposed to be used, water testing results and all other publicly relevant information of all unconventional gas activities and licence applications. Alert interested community members and organisations to new information as it is submitted to the government.

**Regulation examples we could learn from:**

In Alberta, the affected public has the capacity to determine 'No-Go' zones.
There they identified and recommended environmentally sensitive and threatened areas where unconventional gas development is not appropriate and would not be allowed[4].

Germany intends to 'eliminate the risk to the public water supply by banning any kind of fracking in water protection areas, mineral spring protection areas, catchment areas of reservoirs and lakes that are a direct source of drinking water; the federal states may include areas of drinking water production in this ban.

In NSW, residential areas and critical industry clusters have been put off limits to unconventional gas drilling, and gas exploration licences have been bought back by the Government over Sydney's drinking water catchment.

In NSW, the Water Management Act 2000 regulates unconventional gas activities that occur where there is a water sharing plan and includes regulation of the extraction and disposal of water.

In NSW, all additives used in drilling and fracture stimulation processes must be tested by the National Association of Testing Authorities-certified laboratory in order to meet the Australian Drinking Water Health Guidelines[5].

In California, an upfront blanket bond of $1 million for all onshore and offshore wells is required. These costs of bonding for individual wells and for blanket bonds are reflective of the high cost of plugging and reclaiming wells[6].

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[4] Alberta Energy Regulator, CBM Multi-Stakeholder Advisory Committee (MAC) Recommendations: Progress Update – Year 3, Recommendation 4.3.1E,
http://www.energy.alberta.ca/NaturalGas/Gas_Pdfs/MAC2ProgressUpdateFinalNov09.pdf.
[5] NSW Code of Practice for Coal Seam Gas Fracture Stimulation, cl 6.1.
[6] Dogwood Initiative 42.

Colorado gas law establishes an environmental response fund within the Treasury. This fund is supported by mandatory petroleum producer contributions (additional to other fees, reviewed every 2 years), as well as fines and charges recouped under petroleum law[7].

NSW's Independent Pricing and Regulatory Tribunal is in the process of developing benchmarks for landholder compensation which will include compensation for time spent, legal fees and other costs of engaging with gas companies. That state is also developing a state-wide data repository that will be publicly available.

The NSW Chief Scientist recommended an insurance and risk management mechanism, a public environmental rehabilitation fund and a standing body of experts to advise the Government on unconventional gas.

**Case Study: Germany is using world best practice regulation**

Germany is implementing a ban on fracking for CSG and shale drilling less than 3000 metres below ground. The key principle is that 'protection of health and drinking water has absolute priority.' The Government will review the ban in 2021 following a scientific review of environment impacts, as 'it is not currently possible to assess the impact of fracking shale rock and coal beds due to a lack of empirical evidence in Germany'[8].

Germany further proposes to include nine specific conditions on any permitted fracking projects[9]. These include placing the burden of proof on companies regarding any subsidence damage from fracking measures or deep wells; comprehensive environmental impact assessment for all deep drilling; harm to groundwater in a catchment area of public water points or for direct use in food and beverages must be completely ruled out; the identity of all substances and expected quantities used must be disclosed (with provision for a public register); ground and surface water monitoring; supervision of well integrity; and reporting requirements[10].

Thank you for your ongoing work in this area and considering these supplementary comments.

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[7] Colorado Statutes, Title 34. Mineral Resources – Oil and Natural Gas: Conservation and Regulation, Art. 60, § 34-60-122.

[8] 'Announcement of the key principles of the fracking regulation in Germany', Shale Gas Information Platform, GMZ Hemholtz Centre Potsdam, 11 July 2014 (translation from the Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety) at http://www.shale-gas-information-platform.org/areas/news/detail/article/announcement-of-the-key-principles-of-the-frackingregulation-in-germany.html.

[9] 'Fracking for tight gas', a long-standing practice since the 1960s, 'will continue to be allowed in principle'. Also, 'Science-backed tests to investigate impacts the environment and the substrate… may be performed if the fracking fluid does not endanger the groundwater.' Additional water quality regulations will be made.

[10] For more information see: http://www.naturalgaseurope.com/germany-new-fracking-regulations