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Conservation Council of Western Australia
ccwa
Look forward

Submission to Senate Inquiry into Environment Protection and Biodiversity Conservation Amendment Bill 2013, April 4, 2013

Att: Committee Secretary
Senate Standing Committees on Environment and Communications

Summary

The Conservation Council of Western Australia (CCWA) supports the Environmental Protection and Biodiversity Conservation Amendment Bill, insofar as the proposed amendment improves protections of significant water resources.

CCWA is, however, deeply concerned that the amendment is too restrictive, and in particular that it is overly specific concerning the precise nature of gas mining that can constitute an EPBC trigger. CCWA is aware of no sound policy or scientific basis for restriction of the trigger to CSG; on the other hand, given that the risk of serious water pollution from other forms of gas mining (e.g., shale gas, tight gas and coal-to-gas mining) are similarly serious, and the contamination pathways near identical, it is CCWA's strong view that the proposed bill should be amended to refer to threats to water resources from unconventional gas, or from CSG, tight or shale gas, or coal-to-gas mining.

Justification

CCWA is deeply concerned about the potential impacts on the Western Australian environment of tight and shale gas mining. WA is home to extremely large reserves of shale and tight gas - the IEA has estimated resources in the Kimberley to be c.229 trillion cubic feet of natural gas, and in the Perth Basin to be 71 trillion cubic feet of natural gas. In each case, the resource is considerably larger than the gas reserves of the east coast CSG fields (58.8tcf).

Considerable exploratory activity is currently being conducted through these regions, and also in other regions (such as the Ningaloo coast/Carnarvon region). Some companies have moved towards feasibility studies for full-scale production, and one – Buru – recently signed a State Agreement Act with WA to build a major piece of pipeline infrastructure linking its Kimberley gasfields with Karratha, in order to supply WA is domestic gas. It is expected that the proposal will also include a supplementary pipeline supplying gas to the North West shelf LNG facility.

The above considerations give the Conservation Council strong reason to suppose that WA will see relatively rapid development of onshore gas fields in the medium term.

WA's onshore unconventional gasfields will not be covered under the proposed EPBC trigger, because WA's gas is mostly held in tight stone (fine-grained sandstone) and shale. CCWA is acutely aware of the environmental risks that large-scale tight and shale gas mining will bring – particularly to water resources. It is to be noted that the risk to both ground and surface water resources from shale and tight gas mining are similar in both type and magnitude to the risks posed by coal seam gas mining.

Shale and tight gas mining risk water resources in the following ways:

- ***Risk to water from well failure.*** A recent study by Anthony Ingraffea, for instance, demonastrated that 6-7% of shale gas wells leak within a year of being drilled (http://www.psehealthyenergy.org/data/PSE__CementFailureCausesRateAnalaysis_Oct_2012_Ingraffea.pdf). This rate of failure increases over time. In cases in which hydrocarbon contamination occurs, this is generally associated with pollution with NORMs (naturally occurring radiative materials). Of particular concern is radon, the second highest cause of lung cancer. Other substances of concern include volatile organic compounds, many of which can be extremely dangerous, and BTEX chemicals that are released from most shale source rocks during the fracturing process. All of these substances constitute threats to human health.
- ***Possible migration through faults and abandoned wells*.** The WA Mid West, where development is expected to occur first, has extremely complex geology, with the ancient landscape riddled by small faultlines that may allow for migration of dangerous fracking fluids into important water resources. It is also to be noted that the region is 100% reliant on these groundwater resources for drinking water and for farming and other uses.
- ***Risk to surface water resources.*** Only 20% of CSG wells require stimulation (fracturing, or 'fracking') in order to produce economic flows of gas. On the other hand, all shale and tight gas wells require stimulation. Furthermore, shale and tight gas source rocks are much harder than coal seams, and tend to be much deeper lying – a combination of factors which means that much greater quantities of fracturing fluids are required in order to stimulate such wells. Spills and surface leaks can have severe local consequences. Additionally, the risk of pollution related to flooding and inundation are high in the Kimberley region, which experiences period cyclones and other incidents of extremely high rainfall.

The attention of the committee is drawn to the September 2012 European Commission report into the environmental and health impacts of shale gas mining:
http://ec.europa.eu/environment/integration/energy/pdf/fracking%20study.pdf

This study provides a good primer on the threat to ground and surface water that shale gas mining poses. In both cases, the European Commission report suggests that the risk of serious pollution is 'high.'

I have included relevant excerpts from that report in an appendix.

Minister Burke's Response to CCWA's Concerns

Minister Burke has responded to the concerns of CCWA, granting a radio interview to ABC Mid West. The position that the Minister expressed on the issue is that the bill is drafted in the way that it is because of the constraints that the special competencies and terms of reference of the Expert Scientific Committee place on him.

It is submitted that the terms of reference of the Expert Scientific Committee should be expanded to allow them to work on other forms of unconventional gas mining. Given (i) the large potential impact that shale and tight gas mining might have on environments and communities in Western Australia, South Australia, the Northern Territory and SW Queensland, and (ii) that there seems to be no strong policy reason for restricting the water trigger to coal seam gas mining (excluding shale, tight and other forms of unconventional gas mining), it is submitted that it is appropriate that the Amendments' scope should be expanded, along with the scope of the water trigger.

Kind regards,

Jamie Hanson

Appendix: Relevent Excerpts from European Commission Report into Shale Gas Mining.

Relevant sections of the report are excerpted below (pp.viii-x):

> "The study found that there is a high risk of surface and groundwater contamination at various stages of the well pad construction, hydraulic fracturing and gas production processes, and during well abandonment. Cumulative developments could further increase this risk.
>
> Runoff and erosion during early site construction, particularly from storm water, may lead to silt accumulation in surface waters and contaminants entering water bodies, streams and groundwater. This is a problem common to all large scale mining and extraction activities. However, unconventional gas extraction carries a higher risk because it requires high volume processes per installation and the risks increase with multiple installations. Shale gas installations are likely to generate greater storm water runoff, which could affect natural habitats through stream erosion, sediment build up, water degradation and flooding.
> Mitigation measures, such as managed drainage and controls on certain contaminants, are well understood. Therefore the hazard is considered minor for individual installations with a low risk ranking and moderate hazard for cumulative effects with a moderate risk ranking. Road accidents involving vehicles carrying hazardous materials could also result in impacts on surface water.
>
> The study considered the water contamination risks of sequential as well as simultaneous (i) well drilling and (ii) hydraulic fracturing.
>
> (i) Poor well design or construction can lead to subsurface groundwater contamination arising from aquifer penetration by the well, the flow of fluids into, or from rock formations, or the migration of combustible natural gas to water supplies. In a properly constructed well, where there is a large distance between drinking water sources and the gas producing zone and geological conditions are adequate, the risks are considered low for both single and multiple installations. Natural gas well drilling operations use compressed air or muds as the drilling fluid. During the drilling stage, contamination can arise as a result of a failure to maintain storm water controls, ineffective site management, inadequate surface and subsurface containment, poor casing construction, well blowout or component failure. If engineering controls are insufficient, the risk of accidental release increases with multiple shale gas wells. Cuttings produced from wells also need to be properly handled to avoid for instance the risk of

radioactive contamination. Exposure to these could pose a small risk to health, but the study concluded that this would only happen in the event of a major failure of established control systems. No evidence was found that spillage of drilling muds could have a significant effect on surface waters. However, in view of the potential significance of spillages on sensitive water resources, the risks for surface waters were considered to be of moderate significance.

(ii) The risks of surface water and groundwater contamination during the technical hydraulic fracturing stage are considered moderate to high. The likelihood of properly injected fracturing liquid reaching underground sources of drinking water through fractures is remote where there is more than 600 metres separation between the drinking water sources and the producing zone. However, the potential of natural and manmade geological features to increase hydraulic connectivity between deep strata and more shallow formations and to constitute a risk of migration or seepage needs to be duly considered. Where there is no such large depth separation, the risks are greater. If wastewater is used to make up fracturing fluid, this would reduce the water requirement, but increase the risk of introducing naturally occurring chemical contaminants and radioactive materials into aquifers in the event of well failure or of fractures extending out of the production zone. The potential wearing effects of repeated fracturing on well construction components such as casings and cement are not sufficiently understood and more research is needed.

In the production phase, there are a number of potential effects on groundwater associated however with the inadequate design or failure of well casing, leading to potential aquifer contamination. Substances of potential concern include naturally occurring heavy metals, natural gas, naturally occurring radioactive material and technologically enhanced radioactive material from drilling operations. The risks to groundwater are considered to be moderate-high for individual sites, and high for development of multiple sites. Inadequate sealing of a well after abandonment could potentially lead to both groundwater and surface water contamination, although there is currently insufficient information available on the risks posed by the movement of hydraulic fracturing fluid to the surface over the long term to allow these risks to be characterised. The presence of high-salinity fluids in shale gas formations indicates that there is usually no pathway for release of fluids to other formations under the geological conditions typically prevailing in these formations, although recently published research indicates that pathways may potentially exist in certain geological areas such as those encountered in parts of Pennsylvania, emphasising the need for a high standard of characterisation of these conditions.

Water resources
The hydraulic fracturing process is water-intensive and therefore the risk of significant effects due to water abstraction could be high where there are multiple installations. A proportion of the water used is not recovered. If water usage is excessive, this can result in a decrease in the availability of public water supply; adverse effects on aquatic habitats and ecosystems from water degradation, reduced water quantity and quality; changes to water temperature; and erosion. Areas already experiencing water scarcity may be affected especially if the longer term climate change impacts of water supply and demand are taken into account. Reduced water levels may also lead to chemical changes in the water aquifer resulting in bacterial growth causing taste and odour problems with drinking water. The underlying geology may also become destabilised due to upwelling of lower quality water or other substances. Water withdrawal licences for hydraulic fracturing have recently been suspended in some areas of the United States.

Regards,

Jamie Hanson

Conservation Council of WA