Environment Centre NT
protecting nature | living sustainably | creating a climate for change

Dr Allan Hawke AC
Commissioner
Inquiry into Hydraulic Fracturing in the Northern Territory
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Monday, 30 June 2014

Dear Dr Hawke,

Re: Submission to the Inquiry into Hydraulic Fracturing in the NT

Thank you for providing the opportunity to contribute to an Inquiry into Hydraulic Fracturing (Fracking) in the Northern Territory.

Environment Centre NT welcomes this opportunity to contribute to discussions and investigations at this important time.

As you are aware, ECNT has been working closely with community groups, land owners, other organisations and members of the public to support an inquiry to independently verify and assess their concerns and to provide advice to the Northern Territory Government considering whether the costs associated with fracking outweigh the short-term economic benefits it generates.

Please find a submission outlining our substantial concerns with fracking and the inadequacy of the regulatory processes supporting the shale gas and tight gas industry.

Please don't hesitate to contact us should you have any further questions.

Warm regards,

Anna Boustead
Policy Manager

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Submission to the Inquiry into Hydraulic Fracturing in the NT

Executive Summary

Hydraulic Fracturing, or fracking, undeniably presents significant risks to the environment, health, lifestyle, people and economy of the Northern Territory.

It is clear from our research in completing this submission, that there is a wide-ranging amount of information about the impacts of fracking, but that an independent scientific study is required to determine the accuracy of claims made by petroleum companies and government regulators.

It is clear that methods targeting 'unconventional gas' such as horizontal fracking and drilling present considerably higher risks to the environment and the community and therefore must be banned until it can be proven safe beyond reasonable doubt.

In light of recent well failures, a moratorium on fracking must be immediately implemented until the full impacts are investigated and reported in an independent scientific study.

There are immediate issues with regulating petroleum developments which require the urgent attention of this Inquiry.

It is nonsensical that the very department responsible for regulating the petroleum industry is also responsible for regulating it and informing the public of the potential impacts of fracking.

It is also concerning that the Chair of the Environment Protection Authority has publicly stated[1] that he wishes to use the results of this Inquiry essentially as a broad environmental impact assessment process so that the requirement for Environmental Impact Statements does not get in the way of getting the shale gas industry "*up and going, hopefully in a very safe and well managed fashion*".

Furthermore, fracking is unnecessary in an environment where solar energy is cheap, clean, safe and abundant. It places the Territory on a firm path of increasing its reliance on fossil fuels and ignoring its global responsibilities to cut greenhouse gas emissions to avoid the most devastating impacts of climate change.

The NT Government must cease the use of taxpayers dollars to support this risky and potentially very damaging industry and instead invest in a clean energy future.

1. The Role of the Environment Centre NT

The Environment Centre of the Northern Territory (NT) is the peak community sector environment organisation in the Northern Territory.

The mission of the Environment Centre NT is to

- protect and restore biodiversity, ecosystems and ecological processes,

[1] http://www.abc.net.au/news/2014-03-29/fracking-inquiry-may-bypass-need-for-individual/5354280

- foster sustainable living and development, and
- cut greenhouse gas emissions and build renewable energy capacity.

The Environment Centre NT (ECNT) works by

- advocating for the improvement of environmental policies and performance of governments, landholders, business and industry;
- partnering on projects and campaigns with conservation and climate organisations, governments, Indigenous organisations, community groups, businesses, and landholders;
- raising awareness amongst community, government, business and industry about environmental issues and assisting people to reduce their environmental impact;
- supporting community members to participate in decision making processes and action;
- recognising the rights, aspirations, responsibilities and knowledge of the Territory's Indigenous peoples; and,
- acknowledging that environmental issues have a social dimension.

2. Comment on the Terms of Reference of the Inquiry

ECNT considers the Terms of Reference of the Inquiry into Hydraulic Fracturing in the NT to be too narrow to fully account for the potential impacts of fracking. We therefore present the information below in the spirit of inclusion to ensure that any important points outside of the Terms of Reference will still nonetheless be considered and reported by the Inquiry in the interest of transparency and to inform public discussion about the issue.

Although we welcome this opportunity to comment and inform policy on fracking, we also wish to note that the process of the Inquiry did not allow the public to provide full and informed feedback since the government department responsible for holding information about fracking activities, the Department of Mines and Energy (DME), did not provide its submission into the Inquiry until 30 May. Unfortunately we did not have access to a report by the Environmental Protection Authority (EPA) on this issue.

In the absence of clear information from the NT Government outlining the process and history of fracking in the Northern Territory, the following submission refers to the submission provided by the Department of Mines and Energy.

3. The History and Future Prospect of Hydraulic Fracturing in the NT

Although the DME reports that hydraulic fracturing has been carried out in the NT over the past 50 years, it is important to highlight that exploratory fracking to target 'unconventional gas' has only occurred in the NT since 2011 and is far more intrusive than vertical drilling.

It is of considerable concern to ECNT and the general community that each of the three wells horizontally fracked by Petrofrontier in the Georgina Basin from 2012-2014 were abandoned because fracking had caused a potentially significant environmental impact. This occurred either because the well casing had failed (as in the case of Baldwin 2Hst1 on EP 103) or because the wells were found to be communicating with groundwater aquifers (as in the case of Macintyre 2H on EP

127 and Owen 3H on EP 104), evidenced by the presence of hydrogen sulphide. In fact, one well (Owen 3H) was found to be in place over a fault line, representing a serious long-term risk to the environment through contamination of groundwater[2].

This experience, still in recent memory, proves that unconventional fracking does generate a very high risk to the environment and demonstrates the need to adhere to the Precautionary Principle on Ecologically Sustainable Development[3]. It is curious that the DME has asserted in its submission that, in the NT, hydraulic fracturing technology "*has been used for 40 years without environmental incident*" only weeks after these wells were abandoned, given that the environmental impacts are likely yet to become apparent. These incidents must be fully investigated and reported by DME and the EPA.

It is unclear what the level of exploratory fracking will be, and how the long-term or cumulative environmental impacts of these activities are monitored and reported.

4. Recommendations to the Inquiry

ECNT's position on hydraulic fracturing, or 'fracking' in the Northern Territory (NT) is:

1. **That the NT Government must immediately fund an independent scientific study which properly assesses all impacts (environmental, climate, health, social and cultural) caused by fracking both interstate and overseas to assess the risk to the Territory, including a cost-benefit analysis.**
2. **That a moratorium on all fracking exists until all of the risks have been properly assessed by independent scientists.**
3. **That the NT Government immediately bans the use of risky horizontal fracking methods due to the potential significant impact of these methods upon the environment and communities, as well as the lack of need to access shale or tight gas where renewable energies such as solar are readily available.**
4. **That existing legislation (including the *Petroleum Act, Water Act, Environmental Assessment Act*) be amended to ensure any fracking and associated petroleum development takes place according to the Precautionary Principle for Ecologically Sustainable Development.**
5. **That this includes the assessment and establishment of permanent 'no go' zones for towns, communities and sensitive areas as reserved blocks under the *Petroleum Act* (eg. drinking water catchments, sacred sites or protected areas, groundwater recharging zones, food croplands).**
6. **That the current and potential climate impact of the shale gas industry, including fugitive methane emissions, is fully assessed and mitigated and any existing impacts are offset through value-added offset programs such as fire management; and a**

[2] http://www.petrofrontier.com.au/index.php?page=drilling_campaign
[3] United Nations Conference on Environment and Development, Rio, 1992 (the *"Rio Declaration"*).

moratorium on shale gas development is implemented until a climate change policy to reduce the emissions of the NT is developed.

7. **That the NT Government and Geoscience Australia investigate the potential risks of increased seismicity as a result of hydraulic fracturing in the NT.**
8. **That laws and regulations ensure that the onus of proof to demonstrate that fracking is safe for the Territory's environment and communities is borne by the operating companies rather than landowners, including the collection of baseline data prior to any impact.**
9. **That Department of Mines and Energy (DME), the Environmental Protection Authority (EPA), industry bodies and land councils provide an open, transparent process for information to be provided, distributed and discussed throughout communities.**
10. **Companies must obtain free, prior and informed consent from all landholders for exploration and extraction as per best practice management.**
11. **Companies undertaking fracking must be required to respond to the criteria for environmental impact assessment as per any other significant development.**
12. **Water use by mining and petroleum companies must come under the *Water Act* so that companies taking water for fracking are required to apply for a water extraction licence.**
13. **That the water allocation planning process, including a Strategic Indigenous Reserve for economic development by Indigenous communities, is immediately reinstated in accordance with the *National Water Initiative* and statements by the National Water Commission.**
14. **That monitoring and compliance bodies such as the EPA and DME are properly resourced to effectively carry out their responsibilities and any potential conflicts of interests are removed through a review and restructure of those bodies.**
15. **That the independence of the EPA as a regulatory body free from the influence of industry is assured through open, transparent processes.**
16. **That provisions exist to ensure that the operator bears the financial and moral responsibility for any negative impacts caused by fracking, including long-term environmental impacts.**
17. **That the NT Government and Australian Government cease the use of taxpayer dollars to provide subsidies and incentives to mining and petroleum companies to support exploration, extraction and rehabilitation until an adequate regulatory system, climate policy, water allocation planning process and a renewable energy investment strategy is in place.**

5. Identification of issues not addressed by current processes for fracking

Management issues yet to be addressed by the NT *Petroleum Act* and Department of Mines and Energy.

1. How are social, cumulative and long-term impacts assessed and mitigated in the regulatory process?

2. Why is there no opportunity for third party review by members of a public through a Notice of Intent, except for in cases where the NT EPA has deemed the proposal has an unacceptable Environment Plan and poses a significant risk to the environment?
   Members of the public should be given the opportunity to comment on a project application
3. How is the Environment Rehabilitation Security calculated by DME and deemed to be sufficient?
   It is essential that any bond fully covers any potential negative impacts of the development. It is unclear how DME calculates the estimate of the bond to cover rehabilitation if the company is to fail.
4. How does DME maintain a strict separation between its industry support, promotional and regulatory functions?
   It is unclear how this distance is maintained. It seems highly inappropriate that the agency promoting the industry is also responsible for its regulation and monitoring. It represents a potential conflict of interest during the approval process.
5. How are potential long-term environmental impacts of closed well sites monitored?
   The process outlined by DME in its submission does not account for any monitoring of well sites once the close-out report is submitted and the Environment Rehabilitation Security has been returned. This is a considerable omission given that it can take many years for the impacts of groundwater contamination or improper management to become apparent.
6. How is free, prior and informed consent obtained from landholders?
7. How is potential water use through fracking incorporated into the water allocation process and regulations?
8. What independent and accessible information about fracking has been made available to the public by the NT Government?
9. How does DME define a 'stakeholder' during 'comprehensive stakeholder consultation' and how does it determine stakeholders are 'reasonably' satisfied?
10. How are baseline studies carried out and how can the independence of this information be assured?
11. What are the specific detailed regulations around the treatment and disposal of wastewater?
12. What happens if an operator breaches regulations? Are the fines sufficient to be a deterrent?
13. How can DME and EPA be certain that recent failures at well sites haven't contaminated groundwaters, and that this risk is minimised, including impacts to deep aquifers?
14. What policies and processes are in place to avoid over-extraction of water resources?
15. What policies and regulations are in place to detect, measure and avoid fugitive emissions, particularly after a well has been closed?
16. How will the climate impact of fracking be mitigated?
17. What is the level of government investment in renewable energies relative to the investment in shale oil and gas?
18. How is the level of contamination from failures and incidents measured by DME?

19. Is it sufficient for the regulatory framework to merely 'manage and mitigate against adverse environmental outcomes'?
20. How is the environmental risk posed by hydraulic fracturing different to that posed by coal seam gas?
21. How is the DME Guideline 'Assessment Process for Onshore Petroleum Drilling, Workover and Stimulation Application' independently assessed and implemented?
22. How is it appropriate for DME to facilitate disputes between stakeholders and petroleum company where they have a vested interest in the development's approval?
23. What regulations or policies require companies to adequately compensate persons or organisations affected by contamination as a result of fracking?
24. Has a cost-benefit analysis of allowing exploitation of unconventional gas been undertaken by DME or EPA?
25. How can landholders be expected to make informed decisions about whether they allow access to petroleum companies on their properties?
26. How will the results of this Inquiry be reported and implemented?

6. Potential Environmental Impacts

6.1 Climate impact

The Northern Territory does not need to undertake to access 'unconventional gas' to fulfil its energy needs, as outlined below by the ECNT report to the NT Committee on Energy Futures, A Sustainable Energy Future for the Northern Territory[4]. The Northern Territory also has an obligation to fulfil its responsibilities under the Kyoto Protocol to significantly reduce its green house gas emissions. The Second Green Energy Taskforce report highlights that the government-owned Power and Water Corporation has to pay the Australian Government between $12M and $21M annually for failing to meet its obligation to the Renewable Energy Target[5].

6 Shale gas and oil
6.1 In contrast to the massive potential renewable energy offers the NT, the development of an onshore shale oil and gas industry is a step in the wrong direction, for a number of reasons. The Territory has an estimated 200 trillion cubic feet (tcf) of onshore shale gas reserves, according to industry commentators. The Territory can either develop those reserves, or it can act responsibly towards the climate and future generations and not develop them. It cannot do both.

[4] http://www.nt.gov.au/lant/parliamentary-business/committees/future%20energy/Submissions%202013/Submission_No16_Environment_Centre_NT_22_November_2013.pdf
[5] http://www.nt.gov.au/lant/parliamentary-business/committees/future%20energy/Submissions%202013/Submission_No16_Environment_Centre_NT_Attachment_2_Green_Energy_Taskforce_Report_2_22_November_2013.pdf

6.2 The Territory must play its part in stopping global climate change and transitioning to renewable energy resources, and not exploit these enormous reserves.
6.3 Just as east coast states with massive coal reserves should not mine them, neither should the Territory develop its shale gas reserves. Developing an onshore gas industry lock the NT into reliance on a non-renewable fossil fuel source for at least three decades. The Environment Centre NT has serious doubts about the wisdom that sees gas as a "transition fuel" away from coal. These doubts only increase when it comes to unconventional gas sources, such as the massive shale deposits in the NT.
6.4 Technological lock-in would occur if the massive shale gas and oil reserves were developed, meaning future governments and industry would not agree to transition rapidly from them on to renewable energy because their investments in these old energy assets would be stranded and lose value.
6.5 Encouraging major onshore production of gas would make sense in the Territory if it were to hasten a transition from coal to renewables. However this is not the case. The Territory does not generate electricity from burning coal. Hence the transition required to cut greenhouse gas emissions needs to be from the existing predominant energy mix – gas, diesel, bunker fuel and fuel oil to renewables.
6.6 In the case of transitioning from diesel, bunker fuel and fuel oil towards gas to cut generation costs and greenhouse gas emissions, such as at RTA Gove's bauxite refinery, the transition could only last a decade before further transitioning to renewables if the Territory is to implement energy policies consistent with the advice of authoritative global and national organisations regarding climate change. Ref to IEA, IPCC, CCA, etc
6.7 Exploration for oil and gas in coastal waters poses substantial risks to marine wildlife, habitats, fishing and Indigenous sea Country use. The Petroleum Act (NT) and Petroleum (Submerged Lands) Act (NT) provide for coastal waters to be protected from such exploration and production through the reservation of blocks, as exists for Darwin and Bynoe Harbours and Greater Darwin, and as has occurred for mineral exploration around some islands and bays under mining legislation (eg Maria Island, Crocodile Islands, Darwin and Bynoe Harbours).
6.8 Methane gas is an extremely powerful greenhouse gas. Over 20 years, its global warming potential has been estimated as being 72 times stronger than carbon dioxide. Therefore, fugitive emissions (induced through fracking and released during shale gas production, from leaking pipes etc) pose a serious climate risk. US studies have shown that operators with good practice will typically lose 2-3% of the methane they extract through fugitive emissions. At a time when the science tells us we must drastically reduce our emissions, this is of serious concern.
6.9 Estimates of water use suggest that during the process of horizontal hydraulic fracturing (fracking), used to extract shale gas, around 20 million litres of water is used per frack. This is of particular concern given a) the arid nature of much of the NT environment, b) the reliance on bore water by many NT communities, and c) the expected stress on scarce water supplies as climate change intensifies.
The development of an onshore gas industry will require a significant expansion in the

Territory's road network, and significant increase in truck traffic to cart large amounts of water, chemicals and equipment to potentially thousands of gas wells. This in itself will contribute to an increase in carbon emissions through a major increase in truck traffic.

6.11 In other jurisdictions, in response to sustained community pressure and mounting scientific evidence about the risks of fracking, moratoriums and tighter regulations are being introduced: Victoria has a moratorium on fracking; NSW has recently introduced a moratorium on coal seam gas mining and exploration in Sydney water catchment "special areas"; fracking is banned in France and a number of other countries.

6.12 The shale gas industry is still at the very early exploratory stages in the Territory, and the Environment Centre NT recommends that a moratorium be placed on horizontal hydraulic fracturing. Now, before mistakes have been made and aquifers contaminated, is the ideal time to halt this industry and allow for a thorough, independent inquiry into the impacts such an industry would have on the NT environment, economy, and other water-dependent industries such as agriculture.

6.13 Onshore shale gas and oil reserves in the Territory may not be financially viable to exploit due to rising production and a gas glut in the USA – which will see US gas companies compete in Asian markets with Australian LNG, as well as massive reserves in Mozambique, Tanzania and Russia.

6.14 These nations have generally lower labor and infrastructure costs, making Territory-based shale gas and oil projects less competitive. The Territory's remoteness and poorly developed infrastructure similarly mean many onshore gas reserves in the Territory may never be developed, and not because of environmental or land access regulations.

6.15 Further, connecting the Territory's gas pipeline network to the east coast gas pipeline network would add entrench gas as for many decades as the focus for energy production when the Territory should be focusing on reducing emissions from stationery energy and investing in renewables.

6.16 Contrary to statements by the NT Department of Mines and Energy, and Minister for Mines and Energy Willem Westra van Holthe, the Territory's regulatory frameworks for petroleum and environmental assessment/protection are the weakest in Australia. To illustrate, Victoria has a moratorium on coal seam gas but the Territory does not for shale gas. Private landholders in NSW are legally allowed to literally 'lock the gate' on CSG companies to prevent them from entering their lands, while Territory leaseholders are not allowed to prevent shale gas companies entering their pastoral leases. That state has relatively strong protections over access by CSG companies to high grade cropping lands but the Territory does not for shale gas. Similarly exploration for oil and gas is prohibited on National Parks, while Imperial Oil & Gas was recently approved to explore on Limmen National Park.[2]

6.1.1 Fugitive methane emissions

The climate impact of fugitive methane emissions generated by fracking are of considerable concern, as highlighted below by the European Parliament report, The Impact of Shale Gas and Shale Oil Extraction upon the Environment and Human Health[6].

Fugitive Methane emissions from hydraulic fracturing processes can have a huge impact on the greenhouse gas balance. Existing assessments give a range of 18 to 23 g CO2-equivalent per MJ from the development and production of unconventional natural gas[3].

Methane is a powerful greenhouse gas. Fugitive methane emissions are likely to make shale gas more polluting than coal[7].

ECNT considers DME requirements for measuring and limiting the climate impact of fracking through promoting fugitive emissions to be inadequate. Regulations must require operators to measure, report and mitigate their climate impact. DME must also be required to monitor closed well sites for potential escaping gases due to plug or casing failure.

Unconventional methods of gas extraction should be banned in the Northern Territory due to the unregulated climate impact.

6.1.2 Climate impact of transport

There is also no consideration of the climate impact of transporting the gas from well sites to port.

6.1.3 Offsetting the climate impact of fracking

ECNT considers that although renewable energies must be promoted over fossil fuels, during transition to clean energy sources, any petroleum development must be required to consider its global impact in terms of greenhouse gas emissions and move rapidly to abate emissions through the carbon economy. An example of this is the West Arnhem Land Fire Abatement (WALFA) Agreement between Conoco-Phillips, the Northern Territory Government and the Northern Land Council allowing Conoco-Phillips to offset a portion of the greenhouse gas emissions generated by the Channel Point Gas fired Power Station[8].

The WALFA Agreement, while providing for the abatement of greenhouse gases, also provides additional benefits including providing culturally-appropriate local employment in remote communities and the promotion and protection of biodiversity through proper fire management.

[6] http://europeecologie.eu/IMG/pdf/shale-gas-pe-464-425-final.pdf
[7] http://news.cornell.edu/stories/2011/04/fracking-leaks-may-make-gas-dirtier-coal
[8] http://www.nailsma.org.au/walfa-west-arnhem-land-fire-abatement-project

7. Seismic impact

The DME submission to this Inquiry refers to three recorded cases in the USA, Canada and the UK of hydraulic fracturing likely to be causing earthquakes, including one 3.8 Richter earthquake in Canada.

This further highlights the need for a moratorium on all types of fracking and seismic testing until the effects are properly understood and a ban on unconventional methods.

It is of considerable concern that Petrofrontier allowed fracking to occur over a fault line in the Georgina Basin (Owen 3H), a seemingly obvious error in the assessment process.

8. Contamination of water

The large volumes used during the fracking process pose a significant risk to the environment. Of equal concern are the chemicals liberated through the fracking process.

Operators often argue that the chemicals are innocuous since they can be contained in household products. However, it is important to note that this does not necessarily mean they are any less toxic, particularly in large volumes. Evidence from the results of the shale gas 'boom' in Pennsylvania in the USA found 106 confirmed cases of well contamination since 2005 out of more than 5000 new wells[9]. This contamination has put public health, safety and the environment at risk[10]. In Texas, shale gas wells have been linked with above average levels of arsenic, strontium and selenium in local groundwater bores[11].

Another argument, presented by DME in its submission, is it is not harmful because the amount of chemicals is proportionately low when compared to the total volume of water used in the fracking process. However, again, this does not necessarily mean that these chemicals are any less toxic in such large volumes and does not account for their interaction underground, as highlighted below by the European Parliament report, The Impact of Shale Gas and Shale Oil Extraction upon the Environment and Human Health[12].

"At a time when sustainability is key to future operations it can be questioned whether the injection of toxic chemicals in the underground should be allowed, or whether it should be banned as such a practice would restrict or exclude any later use of the contaminated layer (e.g. for geothermal purposes) and as long-term effects are not investigated. In an active shale gas extraction area, about 0.1-0.5 litres of chemicals are injected per square metre." [2]

[9] http://www.usatoday.com/story/money/business/2014/01/05/some-states-confirm-water-pollution-from-drilling/4328859/
[10] http://www.scientificamerican.com/article/groundwater-contamination-may-end-the-gas-fracking-boom/
[11] http://www.rtcc.org/2013/07/29/water-contamination-discovered-near-texas-fracking-sites/
[12] http://europeecologie.eu/IMG/pdf/shale-gas-pe-464-425-final.pdf

There is a lack of peer reviewed science regarding the complex interactions of these chemicals as they go through the fracking process, further highlighting the need for a moratorium until all interactions are known. Petrofrontier outline in their Environment Management Plan for the (now abandoned) Owen well 3H that during fracking, fracking fluid is pumped underground and then sucked up, treated and left to evaporate in turkey nest dams.

It is concerning to note DME's comments in its submission "*to protect commercial confidentiality, the composition of the (fracking) additives is not fully disclosed to the public*".

The incidents of groundwater contamination in the US have led to several civil suits and in some states, changes to regulations allowing companies to be exempt from providing compensation for any contamination caused by their operations[13]. It is important that the public are kept up to date and informed about any potential contamination incidents and the contaminants, and that policies protect the public against unscrupulous development.

It is concerning that only a proportion of the fracking fluid is recovered, leaving the rest underground. Can DME assure the public that none of these substances will contaminate groundwaters?

Furthermore , we could find very little evidence to show how fracking could occur in a tropical wet-dry climate where extremely heavy rainfall events can occur during the wet season, or sporadically at other times during the year. What would happen to turkey nest dams in the event of rainfall?

Western Australia is a useful case study for the Northern Territory, as it has a similar climate and geology and the regulatory processes for petroleum activities are similar to the NT. We note that in its submission to the 2013 Western Australian Government Inquiry into Hydraulic Fracturing, the WA Water Corporation:

"recommends the prohibition of unconventional gas extraction from public drinking water sources. This approach is also endorsed by other regulatory agencies in WA."[14]

It goes on to state that claims by petroleum companies that wastewater can be treated to a safe level are false:

"Furthermore, chemicals used in gas extraction and fracturing are generally noxious and incompatible with the requirements of the National Health and Medical Research Council

[13] http://www.huffingtonpost.com/news/fracking-water-contamination/
[14] http://www.parliament.wa.gov.au/Parliament/commit.nsf/(EvidenceOnly)/6C678FAE3E96186748257BC6002BAF31?opendocument

(NHMRC) for use in Public Drinking Water Source Areas (PDWSAs). We endorse disclosure of all chemicals to the Department of Health.

"Our groundwater sources are extremely vulnerable to contamination. Allowing access of unconventional gas extraction to PDWSAs could if inadequately managed lead to contamination that would require either expensive water treatment, or replacement of the source where grossly contaminated. As well as impacting on affordability, there will be an increased risk to public health because treatment can only reduce contamination, not remove it."[7]

In 2012 the NSW Government put a moratorium on fracking and bans in some areas after incidents of contamination and toxic spills by coal seam gas operators were widely reported.

It is abundantly clear from this evidence that a moratorium on hydraulic fracturing in the NT is immediately required, with a permanent ban on unconventional fracking due to the high level environmental and health risks posed by these methods of gas extraction, particularly through the contamination of water.

We request that the Department of Health, Department of Land Resource Management and the Department of Mines and Energy work closely with the EPA to monitor, report and clean-up contamination from existing and closed fracking wells, including exploratory wells.

9. Water extraction and use

The dewatering of aquifers by mining and petroleum activities is a significant issue for the Northern Territory.

Water extraction and use by mining companies is exempt from the *Water Act*, leaving a disturbing gap in the NT government's water policy which allows mining and petroleum companies to extract water without a water extraction licence.

It is of considerable concern that water use by mining and petroleum companies is not included in the water planning process. DME has a Memorandum of Understanding (MoU) with DLRM to work together on water management, however it is unclear how DME report water extraction by mining companies to DLRM, and how DLRM factor future projected use by mines into their water modelling. ECNT is yet to see the details of this MoU or how it is applied.

This is particularly concerning in the context of recent decisions by the NT Government allowing the Tindall (Mataranka) aquifer to be fully-allocated and the Tindall (Katherine) and Oolloo(Daly) aquifers to be over-allocated, without any water set aside for development by

Indigenous communities and outside of the previously established water allocation planning process[15].

Environment Centre NT calls for the *Water Act, Mining Management Act* and *Petroleum Act* to be amended to include water use by mining and petroleum industries and for the NT Government to provide clear evidence of the current and future projected levels of water extraction by mining and petroleum.

10. Landscape impacts caused by multiple well pads

Australian Council of Learned Academies (ACOLA) state in their report:
"the clearing of land to establish drill sites, levelling of the site, and establishment and construction of access roads can result in impacts on soil, increased fire risk, spread of invasive species and fragmentation of patches of native vegetation, habitats and landscape function."

10.1 Spread of invasive species

Weeds such as Gamba Grass, Mimosa pigra and Para Grass pose an immediate threat to the NT's biodiversity, communities, tourism, recreational fishing and agricultural industries[16].

Weed control is expensive and time-consuming. Scientists and land managers recognise that the first priority in best practice weed management is controlling the further spread of weeds to prevent new infestations.

Increased fragmentation of the landscape, transport, movement and destabilising soils dramatically increase the risk of weeds spreading by human means.

This impact can be managed through quarantine measures, however the sheer level of activity, distances travelled and remoteness decrease the effectiveness of a quarantine program.

10.1.2 Fragmentation of native vegetation

Increased roads, seismic exploration and well sites will contribute to fragmentation of native vegetation, which is known to contribute to the dramatic decline of some species which rely on it for habitat[17].

10.1.3 Increased fire risk

Fire management is an important part of management of Aboriginal lands, National Parks, pastoral properties, and freehold land. It is also an important part of Indigenous cultural practices and opportunity for economic development[18].

[15] http://www.ecnt.org/media/call-independent-review-water-licensing-decisions
[16] http://www.ecnt.org/campaigns/weeds
[17] http://www.lrm.nt.gov.au/__data/assets/pdf_file/0019/5356/Veg-Management-Factsheets_Habitat-Loss_Feb2013.pdf
[18] http://www.nailsma.org.au/carbon/savanna-fire-management

The location of drill site infrastructure and vicinity of highly inflammable and potentially explosive gas wells in remote locations poses several serious risks in the case of bushfire and will make it very difficult to continue to do safe controlled burning.

10.1.4 Biodiversity impacts

The over-extraction of groundwater for fracking and potential risk of groundwater contamination will impact upon the abundance of plants and animals living in groundwater-fed river systems, such as the Daly (Oolloo aquifer) and Roper (Tindall aquifer). It could further endanger threatened species such as the Largetoothed Sawfish, Gouldian Finch and Pig-nosed Turtle, which all rely upon groundwater flows during the dry season[19].

Contamination of air and groundwater can lead to the bioaccumulation of heavy metals and toxins in animals as well as

10.1.5 Air pollution

The flaring of gas through the wastewater treatment and fracking process as well as dust from transport and equipment will pollute the air and contribute to greenhouse gas emissions.

10.1.6 Marine impacts

The Australian Marine Conservation Society is opposed to hydraulic fracturing of the seabed due to the environmental concerns of coastal and offshore fracking.

Potential impacts include:

- Emissions deteriorating air quality, increasing ocean acidification, diminishing ozone protection and adding to changing climate conditions.
- Use of chemical additives very harmful to animals and humans including diesel fuel, biocides, industrial solvents and hydrochloric acid
- Waste water leakage contaminating the ocean, groundwater supply and surface waters
- Surface water pollution contaminating the watershed, leading to bioaccumulation of toxins in animals
- Destabilization and well blowouts/ explosions causing mass contamination and devastation to local marine life.
- Induced earthquakes, or seimicity
- Onshore ground water contamination leading to undrinkable bore water and flammable tap water
- Over-extraction of groundwater leading to reduced river flows

[19] http://www.lrm.nt.gov.au/__data/assets/pdf_file/0016/120346/Daly-Status-Report_Final.pdf

10.1.7 Noise and light pollution

The impact of potentially large numbers of well sites throughout the Territory, apart from being a devastating visual impact, would be a significant disturbance to communities and wildlife in terms of noise and light pollution.

10.1.8 Cumulative impacts

The interaction between the wide-ranging and far-reaching risks of fracking, particularly using unconventional methods, are largely unknown as they depend upon interactions between a range of variables. There is scarce information or provisions through the regulatory process to measure and mitigate long-term environmental impacts, the impact of groundwater contamination, climate impacts or interactions with existing land uses.

As noted by ACOLA, the establishment of independent, peer-reviewed baseline data before hydraulic fracturing is critical to ensure that any environmental impacts can be detected, measured and mitigated.

"Induced seismicity, aquifer contamination, landscape and ecosystem fragmentation, greenhouse and other emissions to the atmosphere, together with potentially adverse social impacts, are all likely to be areas of community concern that will need to be monitored and for which baseline surveys will be required."[20]

Other Potential Impacts

11. Impact on transport infrastructure and traffic

"An unavoidable impact of shale gas and tight oil extraction is a high land occupation due to drilling pads, parking and manouvering areas for trucks, equipment, gas processing and transporting facilities as well as access roads[21]*."*

Increased traffic and movement of large trucks will congest roads and increased the risk to other road users. It is also likely to increase the number of roads, leading to additional costs to the taxpayer and increased landscape fragmentation.

Increased traffic will also increase the risk of accidents and spills. The fact that a suspected fracking chemical spill of NALCO®EC9356A was reported last month on the Plenty Highway[22] indicates the reality of this risk.

12. Health impacts

[20] http://www.acola.org.au/PDF/SAF06FINAL/Final%20Report%20Engineering%20Energy%20June%202013.pdf
[21] http://europeecologie.eu/IMG/pdf/shale-gas-pe-464-425-final.pdf
[22] http://alec.org.au/news-a-events/media-releases/219-fracking-chemical-spills-cocern-in-central-australia-3-6-14.html

ACOLA highlights that major health impacts can occur as a result of air or water contamination.

"Major possible impacts are air emissions of pollutants, groundwater contamination due to uncontrolled gas or fluid flows due to blowouts or spills, leaking fracturing fluid, and uncontrolled waste water discharge. Fracturing fluids contain hazardous substances, and flow-back in addition contains heavy metals and radioactive materials from the deposit. Experience from the USA shows that many accidents happen, which can be harmful to the environment and to human health. The recorded violations of legal requirements amount to about 1-2 percent of all drilling permits. Many of these accidents are due to improper handling or leaking equipment. Furthermore, groundwater contamination by methane, in extreme cases leading to explosion of residential buildings, and potassium chloride leading to salinization of drinking water is reported in the vicinity of gas wells[2]."

Doctors for the Environment report that the impact of industrialisation of whole communities or landscapes can also have a negative impact on the mental health of people living in those communities[23].

Negotiations between petroleum companies and landowners can place families and communities under significant psychological stress as they are forced to make decisions with limited information and in many cases under existing financial stress. Conflicts can fracture communities where companies fail to properly consult with the whole of the community about its proposed activities.

This stress can be alleviated through the provision of accessible, independent information and advice. However, it is important that landowners are not exploited through the negotiation process through being misinformed or in a situation where no other alternative is made available to them. ACOLA notes:

"Many of the most prospective areas for shale gas are subject to Native Title or are designated Aboriginal Lands and it will be important to ensure that traditional owners are aware of the nature and scale and the possible impact of shale gas developments from the start."

It is critical that government departments and land councils provide landowners with access to balanced information about the potential impacts of petroleum exploration and extraction on their lands.

Community members have approached us distraught at the level of exploration going on in their region and fearful of the future their children will have to look forward to. This has

[23] http://www.lockthegate.org.au/health

prompted communities to band together to form groups such as Don't Frack the Territory and Don't Frack Katherine. Unfortunately, these groups have been directly and publicly attacked by the Minister for Mines and Energy on Facebook for not supporting petroleum development (13 May), which we consider to be highly unprofessional, unhelpful and inappropriate behaviour by the Minister.

Many Indigenous and non-Indigenous people rely upon healthy country for hunting, gathering and fishing, particularly remote Indigenous communities where food is expensive and often poor quality[24]. Fracking activities could impact negatively on hunting and fishing by reducing access to land, potentially contaminating water sources and fragmenting the landscape.

It is not inappropriate for fracking to occur in areas where it will negatively impact upon other land uses, environmental values or cultural values.

13. Impact upon existing land management activities and land use

Fracking threatens a range of other land uses, including recreational activities, traditional land management, tourism, agriculture and other industries. It also poses a threat to sacred sites and cultural values.

It is important to recognise to recognise the value of other land uses and the potential negative impact of fracking upon these.

For example, the Daly River catchment provides for a flourishing recreational fishing industry and tourism industry which generates a significant local economy. Traditional Owners rely upon the Daly River for customary purposes including fishing and hunting. The groundwater flows of the Daly River provides for abundant barramundi, prawn and crab fisheries.

It is of considerable concern that there are currently no mechanism to prevent fracking occurring in the vicinity of towns, communities and outstations, outside of the Darwin region.

14. Costs to taxpayers

There is often an underlying assumption made in NT Government literature, including in its submission to the White Paper on Development Northern Australia, that the shale gas industry will provide lucrative benefits in terms of its contribution to the economy.

Environment Centre NT is also aware of cases where the local employment benefits of the petroleum development are overstated by companies in order to appeal to landholders.

[24] http://www.csiro.au/Outcomes/Environment/Biodiversity/HealthyCountryHealthyPeopleReport.aspx

However, in reality most employment opportunities are for specialised skill labour which is usually employed on a Fly In Fly Out basis. Community members also report that companies often grossly understate the environmental impacts of fracking when seeking access to their property for the purposes of exploring for shale gas.

In fact, the shale gas industry is highly subsidised, with taxpayer dollars through a range of incentives. The NT Budget for 2014/15 set aside an additional $8million over four years to support shale gas exploration and extraction. A recent Australia Institute report states that the NT Government has provided over $406 million to mining and petroleum industries over the past six years, with most profits generated by the industries heading offshore[25]. $87.6 million was budgeted in the 2013-14 year.

Additionally, the extraction of shale gas itself is a risky and expensive operation which is acknowledged in the ACOLA report.

"*shale gas will not be cheap gas in most circumstances. It will require a relatively high price to make it profitable to produce*."[26]

This does not account for the costs of clean up for environmental damage caused by fracking. The NT Government has already inherited legacy mines which will require billions of dollars to clean up, although it has recently allocated several million dollars to legacy mines and established a levy on industry to assist to pay for the clean up costs.

Governments must take full account of the costs of fracking when considering the benefits. Companies must be held to account for the promises of employment and income they make to landholders. Landholders must be assisted to properly weigh up the risks of allowing fracking to occur on their property.

15. Free, prior and informed consent

In their submission to the WA Inquiry into Hydraulic Fracturing, Yawuru Native Title Holders Corporation[27] outline the requirements for free, prior and informed consent from Traditional Owners in order to seek access to lands for shale gas exploration and extraction.

The United Nations Declaration on the Rights of Indigenous Peoples states that:

"States shall consult and cooperate in good faith with Indigenous people concerned... in order to obtain their free, prior and informed consent prior to the approval of any project

[25] http://www.smh.com.au/federal-politics/political-news/cost-of-state-mining-and-energy-subsidies-revealed-20140623-3aoxr.html
[26] http://www.acola.org.au/PDF/SAF06FINAL/Final%20Report%20Engineering%20Energy%20June%202013.pdf
[27] http://www.parliament.wa.gov.au/parliament/commit.nsf/(WebInquiries)/6C678FAE3E96186748257BC6002BAF31?opendocument

affecting their land or territories and other resources, particularly in connection to the development, utilisation or exploitation of mineral, water or other resources."

Environment Centre NT views providing Indigenous people and community members with appropriate independent information about the full risks and potential benefits to fracking to be a critical role of land councils and governments. The Environmental Defender's Office NT provides an important service to any person who feels aggrieved or concerned about an environmental incident or issue. Any concerned persons can be referred to the EDO NT for further information or legal assistance about any issue related to fracking development, at edont@edont.org.au.

The Environment Centre NT, in conjunction with the Lock the Gate Alliance, hosts a Community Organiser to assist with concerned persons with advocating for strong protection against fracking. The Community Organiser can be contacted at Shalefree@ecnt.org.