



Public Health Association
AUSTRALIA

PHAA (NT Branch) submission to Northern Territory Legislative Assembly Inquiry into Hydraulic Fracturing

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Introduction

The Public Health Association of Australia Incorporated (PHAA) is recognised as the principal non-government organisation for public health in Australia and works to promote the health and well-being of all Australians. The Association seeks better population health outcomes based on prevention, the social determinants of health and equity principles. The PHAA has a vision for a healthy region, a healthy nation and healthy people living in a healthy society and a sustaining environment while improving and promoting health for all.

Public Health

Public health includes, but goes beyond the treatment of individuals to encompass health promotion, prevention of disease and disability, recovery and rehabilitation, and disability support. This framework, together with attention to the social, economic and environmental determinants of health, provides particular relevance to, and expertly informs PHAA's role.

The Public Health Association of Australia

PHAA is a national organisation comprising around 1900 individual members and representing over 40 professional groups concerned with the promotion of health at a population level.

Key roles of the organisation include the development of policy, capacity building and advocacy. Core to our work is an evidence base drawn from a wide range of members working in public health practice, research, administration and related fields who volunteer their time to inform policy, support advocacy and assist in capacity building within the sector. PHAA supports a preventive approach for better population health outcomes by championing appropriate policies and providing strong support for Australian governments and bodies such as the National Health and Medical Research Council in their efforts to develop and strengthen research and actions in public health.

PHAA has Branches in every State and Territory and a wide range of Special Interest Groups. The Branches work with the National Office in providing policy advice, in organising seminars and public events and in mentoring public health professionals. This work is based on the agreed policies of the PHAA. Our Special Interest Groups provide specific expertise, peer review and professionalism in assisting the National Organisation to respond to issues and challenges as well as providing a close involvement in the development of policies. In addition to these groups the PHAA's Australian and New Zealand Journal of Public Health (ANZJPH) draws on individuals from within PHAA who provide editorial advice, and review and edit the Journal.

Advocacy and capacity building

In recent years PHAA has further developed its role in advocacy to achieve the best possible health outcomes for the community, both through working with all levels of governments and agencies, and promoting key policies and advocacy goals through the media, public events and other means.

Public Health Association of Australia: Northern Territory Branch

The Public Health Association of Australia (PHAA) NT Branch represents the Northern Territory membership of the PHAA. NT Branch members have particular expertise and interest in Aboriginal health, primary health care and nuclear industry issues.

Terms of reference for this inquiry

PHAA acknowledges the benefits of public consultation in ensuring community education, support and involvement in improving public health. We are grateful for the opportunity to respond to the terms of reference. However the terms of reference do not provide scope for full consideration of issues around hydraulic fracturing.

Hydraulic fracturing is the basis for extraction of unconventional gas, particularly shale and tight gas, a fossil fuel used for energy and transport. Therefore this inquiry could be used as a basis for a more general inquiry into NT energy policy, including the range of options for our own energy supply and export to other countries. NT has vast reserves of renewable energy sources, in particular solar and wind, which can be used for energy and economic development. The limitation of this inquiry to details about hydraulic fracturing obstructs our capacity to consider all options both now and into the future.

Beyond the limitation with respect to the focus, the terms of reference of this inquiry make no reference to health or social impacts of hydraulic fracturing. Since the goal of any industry is ultimately to improve human well-being, often via economic development, it is appropriate to consider any human costs, through health and social impact.

While this inquiry is solely related to hydraulic fracturing which is used in the extraction of unconventional gas, there are other environmental and health concerns with unconventional gas that are not addressed in the terms of reference for this inquiry.

We noted that inquiries have been held around the country to consider the risks and requirements for hydraulic fracturing. (1). A national set of requirements for consistent health impact assessment across jurisdictions should be considered to protect the health of the Australian public while optimising economic opportunities (2).

We are alarmed at the proposal to by-pass standard Environmental Impact Assessment procedures through this inquiry (3). Each proposal has distinct features in relation to benefits and costs to community, air and water quality, biodiversity, Aboriginal cultural heritage and other issues. The suggestion that one inquiry over a period of two months can make further impact assessment unnecessary suggests that the Environmental Protection Authority has a limited view of environmental impact assessment (EIA). EIA draws attention to distinct features of each proposal. Individual impact assessment of each proposal is particularly important now, because hydraulic fracturing is a relatively new process in Australia, and needs intense monitoring while we learn of its impacts. PHAA does not see any urgency in allowing fracking to proceed, since these fossil fuel reserves are millions of years old, and will remain indefinitely unless there is a decision to exploit them. We believe it is essential that each individual proposal undergo Environmental Impact Assessment. Companies anticipate significant income from these proposals and are well placed to consult experts in environmental issues and the public to ensure the best possible outcomes for the Territory environment.

Key Recommendations

- 1. A broader inquiry into energy policy and economic development in the NT should be undertaken to establish economic and health effects of a range of potential energy sources, instead of this limited inquiry into hydraulic fracturing.**
- 2. Health and social impacts should be specifically included in order to gain a full picture of the impact of unconventional gas on NT residents. A broader inquiry into unconventional gas would draw attention to potential impacts of unconventional gas development that are not included in this inquiry into hydraulic fracturing.**
- 3. A nationally standardised health assessment process is needed to determine a safe regulatory environment for each jurisdiction.**

Response to Terms of Reference

Hydraulic fracturing for hydrocarbon deposits in the Territory, including the assessment of the environmental risks and actual environmental impacts of hydraulic fracturing and the effectiveness of mitigation measures, and more particularly the matters mentioned in the following clauses:

- 1. Historical and proposed use of hydraulic fracturing (exploration, appraisal and production) of hydrocarbon deposits in the Northern Territory (number of wells, locations, timeline).*

Hydraulic fracturing or "fracking" is used in extraction of unconventional gas (UG) deposits, which include Coal Seam Gas (CSG), shale and tight gas. Fracking involves pumping a mixture of water, sand and chemical additives at high pressure into the coal seam or shale rock via a well. This fractures the rock and provides a pathway for gas to flow back. In coal seams the gas is released through depressurization, where the underground water in the seams is released to the surface as a by-product. This can potentially affect aquifers above or below the coal seam.

Shale gas seams occur at much deeper levels and hydraulic fracturing involving large volumes of water with chemical additives is required to extract the gas.

Information available to PHAA suggests that hydraulic fracturing has not yet been used in NT. However government and industry sources suggest that it has been considered to extend the productive life of the Mereenie field near Palm Valley (4, 5). We note that even where there has not been fracking, leakage of gas has reportedly polluted underground water in the area (6). While this inquiry focusses on issues related to fracking, the fact that gas extraction without fracking can lead to water pollution and other problems, highlights the overall risks of this industry, particularly in NT where mining can be extremely remote. Therefore PHAA recommends a precautionary approach recognising pollution risks. It is also noteworthy that the nearby community of Ntaria is partially powered by a solar energy service, and this highlights the possibilities for sustainable energy in the region (7).

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2. Environmental outcomes of each hydraulic fracturing activity for hydrocarbon resources in the Northern Territory (number of wells; frequency of types of known environmental impacts).

Hydraulic fracturing, popularly called "fracking", requires drilling large numbers of wells and each well has a limited lifespan, typically 5 to 15 years (8). Over time many wells are required, over a vast area of land. This can create an extensive landscape footprint, with associated potential environmental impact. With 90% of the NT land area under petroleum exploration title (9), unless restrictions are imposed by government we could see large areas of the Territory become an industrialised by this process.

Considering the effects of each fracking activity alone fails to acknowledge the broader impact. There are concerns about the about the extensive area which the infrastructure of a gas field may cover, and also the impact on people's health where gas extraction occurs near communities.

3. Frequency of types and causes of environmental impacts from hydraulic fracturing for hydrocarbon deposits in the Northern Territory and for similar deposits in other parts of the world.

Modern hydraulic fracturing is a relatively new technology in Australia, so to date there is limited information on environmental outcomes and resulting health effects (10). Hence we would urge precaution, and a close monitoring of the environmental outcomes of hydraulic fracturing activity being undertaken elsewhere, in Australia and around the world. (10).

A range of environmental impacts of hydraulic fracturing have been described by the United Nations Environment Program (8). Each of these environmental impacts is important as are potential resulting health impacts.

Greenhouse gas emissions

Compared with coal, oil and gas produce less carbon dioxide when energy is produced. This has led to the proposal that natural gas should be used to enable societies to transition from using coal to using renewable energy sources. Together with improvements in technology for gas extraction, including hydraulic fracturing, this proposal has contributed to the rapid increase in the use of gas as a fuel globally (8).

However, it now appears that anticipated lower greenhouse gas emissions from gas produced through hydraulic fracturing were grossly overstated. It is now thought that hydrocarbons that are extracted through hydraulic fracturing may have almost equivalent greenhouse gas per unit energy as coal if fugitive emissions are included. Effective monitoring of methane release may in fact demonstrate that greenhouse gas emissions released by hydraulic fracturing are similar to those from coal (8).

Hence from the perspective of greenhouse gas emissions leading to climate change, hydraulic fracturing presents no benefit and a similar unacceptable risk (8, 11).

4. The potential for multiple well pads to reduce or enhance the risks of environmental impacts.

When hydraulic fracturing is used to extract gas, a vast number of wells are required. This makes a large footprint on the landscape as shown in these images from Queensland where almost 19000 wells were approved over a 12 month period (12).



Hydraulic fracturing operations, leading to industrialisation of the food producing Darling Downs area, Tara, Qld, 2011.

Impact on agriculture and food security

Depending on the location of the gas field food security may be affected by land use or contamination issues (13). This may be a particular concern to Aboriginal people whose very notion of well-being depends on their relationship to the land which is both a food security and social issue (14).

Impact on biodiversity

Biodiversity may be affected by water extraction and availability, or from surface or subsurface contamination. Chemical additives used, or chemicals formed or liberated, can be toxic to plants and animals, as well as to human health. This is of particular concern in NT where 90% of the water supply is groundwater, despite the heavy rains in the tropical wet season (15). There are compounds widely used in fracking, which are highly toxic to aquatic organisms (1).

There is generally a greater potential for higher exposures in wildlife and farm animals than humans. The adverse impacts on domestic and farm animals have been highlighted by a study by Bamberger and Oswald in the US (16). The paper reports multiple accounts of adverse effects in herd and domestic animals that live near unconventional gas installations. Risks to native animals are unknown, but there is the potential for threatening native species.

Invasive species of weeds can be introduced through multiple vehicle and personnel movements, with drilling rigs and trucks being taken from one location to another. The sources and expected volumes of water to be used in fracking must be available for public scrutiny prior to any development proceeding.

Social impact

The social impact of the unconventional gas industry is reported to be impacting on community function in Australia and elsewhere, as people respond to conflicting demands for their land or well-being. For example, police in Queensland have forcibly removed people attempting to prevent hydraulic fracturing on their own land (13). There are additional concerns in NT with its significant and extremely disadvantaged Aboriginal population. As occurred with the proposed nuclear waste

dump at Muckaty, promises of economic development can be divisive and destructive for Aboriginal communities (17).

'Solastalgia', the phenomenon of psychological distress arising from loss of familiar and cherished landscape and sense of place, has also been described in the context of extractive industries such as unconventional gas. Psychosocial distress can affect people's economic and social functioning and well-being (18).

Transport for gasfield development entails further risks, particularly as large numbers of heavy vehicles are required. NT already has by far the highest road toll of the states and territories of Australia, and we spend three times as much per capita on the effects of road crashes compared to the national average (19). Trucking for hydraulic fracturing can be a 24 hour operation. Increased risks of road transport crashes associated with development of hydraulic fracturing will contribute to the economic and health burden of our road system (8).

There are possible legal implications of the health risks of hydraulic fracturing as shown by a case in the USA. One family was reportedly granted a payout of \$US3 million dollars compensation as a result of exposure to emissions of hydraulic fracturing (20).

5. The relationship between environmental outcomes of hydraulic fracturing of shale petroleum deposits with geology, hydrogeology and hydrology

Hydraulic fracturing involves the use of chemicals to enable the release of hydrocarbons. Many of the chemicals used for hydraulic fracturing in Australia have not been assessed for their impacts on human health and the environment. Of the 23 identified as commonly used in hydraulic fracturing, only two have been assessed by the National Industrial Chemicals Notification and Assessment Scheme (NICNAS) regulator (13). Given sufficient dose and exposures, chemicals used in fracking or mobilised through the process may have long-term health effects that may not be immediately demonstrated. Many have the potential to affect the skin, eyes, respiratory and gastrointestinal systems, brain and nervous system, immune and cardiovascular systems, or the kidneys. Some may affect the endocrine system or even be carcinogens. It is essential that companies involved in hydraulic fracturing publically disclose all chemicals that are in use prior to any activity (8, 10).

A UK conference on hydraulic fracturing noted:

"Environmental exposures include outdoor air pollutants (ie, volatile organic compounds, tropospheric ozone, and diesel particulate matter) and water pollutants (ie, benzene, hydrocarbons, endocrine-disrupting chemicals, and heavy metals) in both ground and surface water. Known occupational hazards include airborne silica exposure at the well pad. Toxicological data for the chemicals injected into wells (so-called frac fluid) indicate that many of them have known adverse effects on health, with no toxicological data available for some (10)."

When systems are functioning according to best practice, the industry may promote an acceptable safety record. Nonetheless exposure can occur through accidents, leaks, natural events such as flooding, or even through *normal operations*. There are many different possible sources of leakage or infiltration because of the complexity of the hydraulic fracturing process, and the on-going toxicity of the chemicals even after hydrocarbon extraction has ceased. The reported \$US 3million

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payout to a family suffering from fracking-related contaminants, demonstrates legal recognition of this risk. (20).

Intensive and on-going regulation and monitoring are essential to minimise risks. However the NT's difficulty in ensuring the safety of staff at Ranger Uranium mine makes the risk of hydraulic fracturing concerning (21). Requirements for regulation and monitoring are essential with appropriate penalties if standards are breached, including immediate closure of operations.

Hydraulic fracturing is an extremely water-intensive practice. A single fracking operation may use around 20 million litres. The United Nations Environment Program states that hydraulic fracturing should be avoided in areas of water scarcity (8). The NT government's recent evaluation of ground-water supplies found significant data gaps including lack of strategic monitoring of groundwater levels (15). Basic understanding of ground water supplies which provide 90% of our water prior to any consideration of fracking is required.

6. The potential for regional and area variations of the risk of environmental impacts from hydraulic fracturing in the Northern Territory.

Location of hydraulic fracturing activities will affect its social impact. A well-paid, young workforce may have positive impacts by re-vitalising rural areas. However improvements in Aboriginal employment through mining and extraction industries have been disappointing. Mining developments have not always improved the well-being of Aboriginal communities, despite employment possibilities and royalty payments. Adverse impacts related to fly-in-fly-out workforces include disparities in wealth and loss of social cohesion. Alcohol consumption by workers can exacerbate this effect, leading to overall negative impacts on communities, despite increases in economic activity within the community. Studies of mining in Queensland have shown that despite remarkable development in rural areas, local people and their lives may not be improved. (22).

7. Effective methods for mitigating potential environmental impacts before, during and after hydraulic fracturing.

- a. the selection of sites for wells;*
- b. well design, construction, standards, control and operational safety and well integrity rating;*
- c. water use;*
- d. chemical use;*
- e. disposal and treatment of waste water and drilling muds;*
- f. fugitive emissions;*
- g. noise;*
- h. monitoring requirements;*
- i. the use of single or multiple well pads;*
- j. rehabilitation and closure of wells (exploratory and production) including issues associated with corrosion and long term post closure;*

k. site rehabilitation for areas where hydraulic fracturing activities have occurred.

Local, regional and global concerns related to fracking and its medium and long term outcomes, and site rehabilitation, continue to be raised throughout the world (2,8, 10,23). We propose that approval for any activity involving hydraulic fracturing be deferred until the effects are better understood, and effective mitigating and monitoring methods have been established. Hydrocarbons are fossil fuels which will persist indefinitely and there is no urgency to extract them during these early days of unconventional gas industries.

The information available to date suggests that it is not in the interests of the people of the NT to rush into developing this industry until risks are better understood. However should other concerns override, then any approval for fracking should require that the site be rehabilitated as far as possible to its original condition.

Recommendations/Conclusion

Recommendation 1

A broader inquiry into energy policy and economic development in the NT should be undertaken to establish economic and health effects of a range of potential energy sources, instead of this limited inquiry into hydraulic fracturing.

Recommendation 2

Health and social impacts should be specifically included in order to gain a full picture of the impact of unconventional gas mining on NT residents and environment. A broader inquiry into unconventional gas, would draw attention to potential impacts of unconventional gas development that are not included in this inquiry into hydraulic fracturing.

Recommendation 4

A nationally standardised health assessment process is needed to determine a safe regulatory environment for each jurisdiction

Recommendation 5

The NT government should design a plan to achieve transition from fossil fuels to renewable energy sources for both domestic use and economic development. Royalties and taxes derived from industries based on hydrocarbons should be re-invested in research and development on alternative sources of energy, most likely solar and wind, and on energy-saving policies.

Recommendation 6

A moratorium on hydraulic fracturing should be implemented until there is a better understanding of the health and environmental effects of this technology.

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Recommendation 7

All companies involved in hydraulic fracturing should publically disclose all chemical products used in the process and all chemicals should be approved for safety by the national chemical regulator before use.

Recommendation 8

Effective monitoring and enforcement procedures should be implemented, including epidemiological studies of health impacts, and investment in groundwater monitoring.

Recommendation 9

Robust regulations and adherence to industry best practice should be required, particularly in the areas of well design and cementing, in order to completely isolate the well from other strata, and especially from freshwater aquifers. Where compliance is inadequate, further exploration and extraction should be ceased immediately pending full investigation.

Recommendation 10

All companies involved in hydraulic fracturing should demonstrate that they hold adequate funds for restoration of land and water supplies and to mitigate any potential impacts , in order to avoid so-called “extract and run” practices.

The Public Health Association of Australia (PHAA) NT Branch appreciates the opportunity to provide input to the NT Legislative Assembly Inquiry into Hydraulic Fracturing.

Please do not hesitate to contact PHAA should you requires additional information – or have any queries – in relation to this submission.



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