

WA DEPARTMENT OF HEALTH SUBMISSION

TO

**STANDING COMMITTEE ON
ENVIRONMENT AND PUBLIC AFFAIRS**

***Inquiry into the Implications for Western Australia of Hydraulic
fracturing for Unconventional Gas***

October 2013

Background

On 7 August 2013, the Standing Committee on Environment and Public Affairs resolved to inquire into and report on the implications for Western Australia of hydraulic fracturing for unconventional gas, including:

- a) how hydraulic fracturing may impact on current and future uses of land;
- b) the regulation of chemicals used in the hydraulic fracturing process;
- c) the use of ground water in the hydraulic fracturing process and the potential for recycling of produced water; and
- d) the reclamation (rehabilitation) of land that has been hydraulically fractured.

Department of Health (DOH) Roles and Responsibilities

The *Health Act, 1911* (as amended) (the Act) identifies the powers of the Executive Director Public Health (EDPH), including the power to make inquiries (Section 13) and the power to act in emergencies (Section 15). Sections 129, 130 and 131 of the Act do provide some specific powers to DOH in relation to the protection of water supplies.

The Act, due to its age, is limited in its capacity to be applied proactively and on a risk management basis.

Other regulatory agencies that have statutory decision making powers are now seeking our advice to inform their processes. For instance, The Department of Health (DOH) Environmental Health Directorate (EHD) assists the Environmental Protection Authority (EPA), the Department of Environment Regulation (DER), the Department of Mines and Petroleum (DMP), upon request, with assessments and provides advice on health issues related to safety of food and drinking water, wastewater management, mosquito control and where applicable, exposure protection from emissions.

However, this usually occurs because of interagency agreements rather than a legislative requirement. Further, the standing of DOH advice has not been tested. At best this occurs after a project has been designed and an impact/risk assessment has been scoped. This means that, at times, in dealing with contentious public issues, DOH input has not been sought until the end of the process, or when a crisis develops. As a result, DOH are often trying to interpret existing situations rather than proactively informing best practice to avoid or manage risks to Public Health.

Better results have been achieved where DOH has been consulted from the start. This allows early recognition of the issues and inclusion of DOH advice in making the decision and in the ongoing management approach.

The recent approach taken by the Department of Water (DoW), in regards to Managed Aquifer Recharge, is a good example of the benefits of early engagement with the DOH to address both real and perceived Public Health risks. (WA Department of Water, 2010)

In 2007, the Legislative Assembly Education and Health Standing Committee Inquiry into the Cause and Extent of Lead Pollution in the Esperance Area was "...persuaded that the Department of Health's position, that it be given a defined legislative role in the approval of resource proposals should be supported." (Legislative Assembly, 2007 p. 94). The Public Health Bill, which contains provisions to clearly define the DOH's role and provide it with the necessary risk-management powers, has not yet entered Parliament and the standing of any DOH advice has not legally changed since 2007.

The Committee also identified a recurring theme of a “...failure to place Public Health considerations on the same basis of other considerations.” (Legislative Assembly, 2007 p. 93).

In order to protect Public Health and to reassure the public of Western Australia (WA) it is imperative that in the case of approvals for Hydraulic fracturing, the DMP as the decision making body **do** place Public Health considerations on the same basis of other considerations. In order to do this the DMP should engage DOH in the decision - making process.

In addressing Public Health considerations, related to Hydraulic fracturing, DOH has identified four key factors that need to be considered:

1. good risk communications with transparent and accountable disclosure of risks;
2. confidence in “the regulator” to properly oversee and hold proponents accountable in relation to Public Health risk management commitments;
3. the precautionary principle;
 - a. if there is a serious Public Health risk, lack of full scientific certainty should not be used as a reason for postponing measures to prevent, control or abate that risk; and
 - b. in the application of the precautionary principle, decision-making should be guided by;
 - i. a careful evaluation to avoid, where practicable, serious harm to Public Health; and
 - ii. an assessment of the risk-weighted consequences of the options;
4. respect for Commercial in Confidence needs to be balanced as much as possible against the benefits of transparency in the risk communication process. DOH support of proposals may be limited by the degree of information sharing regarding use of potential contaminants by proponents.

The DMP regulates the oil and gas industry and the DOH has no formal role in the approvals process for petroleum drilling licenses, or in the establishment of onshore or offshore drilling fields. However, the DOH is involved in continuing communication with DMP. In recent times the EHD has had the opportunity to review and comment on legislation and guidance documents for the petroleum industry and continues to contribute to several DMP working groups providing advice on the development of relevant documents and processes.

Definitions:

Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity (World Health Organisation, 1948).

Public Health means the physical, mental and social wellbeing of the community (Draft *Public Health Bill*, 2008)

Riparian proprietor under common law is someone who owns land on the bank of a natural watercourse or body of water. (The Macquarie Dictionary Online © Macquarie Dictionary Publishers Pty Ltd.)

Sensitive land uses means land uses considered to be potentially sensitive to emissions from industry and infrastructure, and includes residential developments, hospitals, hotels, motels, hostels, caravan parks, schools, nursing homes, child care facilities, shopping centres, playgrounds, and some public buildings. Some commercial, institutional and industrial land uses which require high levels of amenity or are sensitive to particular emissions may also be considered “sensitive land uses”. Examples include some retail outlets, offices and training centres, and some types of storage and manufacturing facilities. (EPA, 2005)

The Department of Health Preliminary Health Risk Assessment of Hydraulic fracturing

The DOH has undertaken a Preliminary Health Risk Assessment of hydraulic fracturing for Unconventional Gas (PHRA) (copy attached) and has reviewed its legislative powers in this area. As a result the following issues have been identified in relation to potential impacts on Public Health from hydraulic fracturing.

1. Potential for contamination of Drinking water supplies

The PHRA identified that hydraulic fracturing has the potential to contaminate groundwater including drinking water supplies. The major sources of potential contamination were identified as the hydraulic fracturing fluid and flowback fluid.

Although the PHRA attempts to be as comprehensive as possible in the assessment of the potential adverse consequences to the water supply from hydraulic fracturing, there are some issues that have not been addressed in detail. Issues such as contamination through radiation, bioaccumulation, disturbance of toxic sediments in aquifers and contamination through gaseous seepage of substances other than methane are some of the issues that have not been addressed in this study. This is because there is currently insufficient research to permit proper consideration of their risk.

2. Public Health Legislation

Section 129 of the *Health Act 1911* provides that it is an offence to pollute or defile or to permit or suffer a water supply to be polluted or defiled.

Section 130 grants the rights of a riparian proprietor to the local government whenever any water supply becomes, or is likely to become injurious to health.

Section 131 provides the power for a local government in its own right or if required by the EDPH to close a water supply if it should become unfit for human consumption.

These Health Act provisions provide powers to prosecute offenders (with limited penalties) and to close water sources that become unfit for human consumption, however, they provide little in the way of proactively assessing risks to water supply and preventing contamination.

In the absence of broad reaching Public Health Legislation, the DOH has limited scope to manage risks to Public Health related to hydraulic fracturing. As a result, the DOH is largely reliant on other legislation administered by other government departments to take proactive action for the protection of Public Health.

3. Other Regulatory Frameworks

It is understood that the DMP will be the principal decision making authority with regard to proposed Hydraulic fracturing operations. Considering the limited scope the DOH has for taking proactive measures for protecting Public Health, it is vital that the DMP regulatory framework includes provision for requiring the full disclosure by proponents of substances to be used in hydraulic fracturing fluids, and requires the conduct of a HRA where there are no Australian standards or guidelines for those substances in drinking water. It is critical that in assessing any such proposal the DMP, the EPA, the DER and the DoW seek and properly consider advice from the DOH regarding any potential risk to Public Health.

4. Department of Water: Protection of Water Sources

Furthermore the DOH is reliant on DoW to protect water sources. The DOH supports the protection of Public Drinking Water Source Areas (PDWSA) through the designation of P1

and P2 Priority source protection areas implemented under the PDWSA Protection Framework. Hydraulic fracturing activities should not take place within such areas. Additionally, the DOH promotes the separation of hydraulic fracturing from private drinking water wells, 100 year flood plains and “sensitive land uses” by the EPA industrial separation distance of 2000m for all oil and gas production fields (EPA, 2005).

5. Beneficial use of Waste Water

Where it is proposed to use waste water from hydraulic fracturing for a beneficial non-potable use such as in agriculture, industry, fire control, or municipal, residential or commercial property use, the proposal should be assessed using the National Health Medical Research Council (NHMRC) *National Guidelines for Water Recycling: Managing Health and Environmental Risks* (Phase 1).

6. Other Potential Contamination Issues

The most significant potential risk to Public Health from hydraulic fracturing is from the contamination of water supplies. As a result this submission focuses on managing impacts of this kind. There may be some Public Health risk associated with air or soil contamination issues, and these can be addressed if and when the need arises.

7. “Mine” Closure plan

In order to ensure the protection of Public Health after the closure of a Hydraulic fracturing “mine”, it should be necessary to require the submission and approval of a Closure Plan prior to the issue of a drilling licence. This will be particularly important in situations where there is ongoing storage of returned flowback water and hydraulic fracturing fluids. These plans may need to include ongoing monitoring of the stored liquid waste and groundwater for some time after the closure of fracturing operations.

Response to Inquiry Issues

a) How hydraulic fracturing may impact on current and future uses of land;

- Most unconventional gas “plays” in WA are in shale deposits. These plays are usually quite dry and require the introduction of large quantities of water. This results in large volumes of flowback and process water. This flowback and process water may contain; cuttings, proppants, total dissolved solids, chlorides (brine), surfactants, gelling agents, metals, corrosion inhibitors, friction reducers, micro-biocides, hydrocarbons (oil), gas, heavy metals (e.g. arsenic) and naturally occurring radioactive materials. Many of these substances may be present in toxic concentrations.
- Mismanagement of these waters may impact on current and future land uses via the following mechanisms.
 - the abstraction of water resources may modify groundwater levels, surface water levels and stream flows;
 - surface water issues: stormwater runoff, flood damage, surface spills, leaks and erosion of pit or surface impoundment failures;
 - ground water contamination;
 - loss of concentrated fracturing fluids and flowback water through tank ruptures, equipment failure or overfills, contaminating groundwater or surrounding land; and
 - environmental release of chemicals used during exploration or production leading to potential contamination of food or fibre (livestock or plant).
- It is known that the extraction and processing of natural ores, oils and gases may give rise to the concentration of naturally occurring radioactive materials (NORMs) in

both process and waste water streams. Radiation monitoring of these streams will need to be conducted and if the radiation levels exceed the exemption levels contained within the *Western Australian Radiation Safety (General) Regulations* the requirements of the *Western Australian Radiation Safety Act 1975* will apply.

b) The regulation of substances used in the hydraulic fracturing process;

- The PHRA produced a list of 195 chemicals of concern. Some are known as suspected carcinogens and some have been reported to have possible developmental or reproductive toxicity. Many of the chemicals do not have a health guideline value for oral intake.
- There is also the potential for contamination of the fracturing fluids and/or flowback water by the ground water or other material encountered during the fracturing operation. These contaminants will also need to be identified and risk assessed.
- There is a lack of chemical disclosure on the proponents' website citing commercial in confidence reasons for non-disclosure (<http://www.dmp.wa.gov.au/15147.aspx>) This lack of disclosure may delay or prevent the proper assessment of the potential impacts on human health and lead to appropriate precautionary measures being put in place to protect Public Health. Further, open and transparent disclosure of these chemicals to the public is fundamental to proper risk communication.
- DOH approval for a project will be contingent upon the preparation of a proper risk communication plan.

c) The use of ground water in the hydraulic fracturing process and the potential for recycling of produced water;

- The principal concerns around the use of groundwater and its potential for recycling, centre on the impacts associated with any contamination of the ground water, which may occur through addition of fracturing fluids or from the fractured area (eg Oil, naturally occurring radionuclides, or heavy metals).

d) The reclamation (rehabilitation) of land that has been hydraulically fractured.

- Upon closure of the hydraulic fracturing operation it is vital that the bore is properly sealed to prevent leakage.

Recommendations

DOH has a number of recommendations to make with regard to the implications of hydraulic fracturing for unconventional gas. These recommendations have been grouped into two categories being Strategic and Technical.

The Strategic Recommendations relate to high level issues aimed at ensuring that Public Health and risk communication issues are adequately addressed during the project approvals process as regulated by DMP.

The Technical Recommendations address more detailed issues of a technical nature.

Strategic Recommendations

1. A Memorandum of Understanding (MOU) between DMP and DOH should be put in place to review chemical risk assessment for petroleum programs drilling, including hydraulic fracturing for unconventional gas. The MOU should include details of:
 - a. an initial assessment scoping process to provide for an early decision as to whether there are likely to be any Public Health risk and whether they should be assessed and by whom; and

- b. early alert conditions for referral of proposals to DOH.
2. The DMP approvals framework should acknowledge and include the role of DOH including details:
 - a. as to whether and when proposals are referred to DOH for advice;
 - b. approvals transparently showing how DOH advice was used;
 - c. ensuring that, where risks to Public Health do exist, appropriate measures are put in place to deal with them according to DOH guidelines; and
 - d. of DMP commitments to audit the proponent's compliance with DOH guidelines and report on any non-compliances, impacting on Public Health, to DOH in a timely manner.
3. Proponents should be required to prepare and implement an open and transparent risk communication strategy.
4. All decisions relating to hydraulic fracturing should be transparent with all decision-making being properly supported with scientific evidence and in accordance with the Precautionary Principle.
5. If onshore unconventional oil and gas wells are not defined as "mining operations" under the Mine Operations Regulations 16, then the regulation of radioactive substances will fall under the jurisdiction of the Radiological Council

Technical Recommendations

1. Proponents should be required to make full public disclosure of substances used in hydraulic fracturing, and likely to be present in flowback fluid and processing water.
2. All substances used in hydraulic fracturing should be subject to approval.
3. Background measurements of waterways and groundwater should be undertaken.
4. Monitoring of substances in surrounding water sources should be conducted.
5. Application of the Australian Drinking Water Guidelines to chemicals found in water used or available for use for drinking water purposes.
6. Guideline values for each substance present in hydraulic fracturing fluid or flowback fluid should be provided and an appropriate health risk assessment undertaken.
7. A Health Risk Assessment should be undertaken where no health guidelines are available for chemicals in water.
8. Gross alpha and beta radiation monitoring of process and waste water streams should be conducted and if the radiation levels exceed the exemption levels contained within the *Western Australian Radiation Safety (General) Regulations* the requirements of the *Western Australian Radiation Safety Act 1975* will apply.
9. Proponents should be required to conduct mandatory monitoring of substances present in the hydraulic fracturing process and surrounding waterways and sources at multiple time points (to be specified) after hydraulic fracturing has occurred.
10. Hydraulic fracturing bore design should reflect best practice to prevent contamination of groundwater.
11. Operators should be subject to compulsory competency and compliance auditing. (DMP).
12. Drill cuttings should be subject to controlled waste disposal (DER).
13. International best practice should be used for the storage and disposal of hydraulic fracturing fluids.

14. Exclusion zones should be created around well heads, to ensure adequate separation between hydraulic fracturing operations and water supplies intended for human consumption.
15. Any (beneficial) water re-use should be subject to NHMRC *Phase 1 Recycled Water Guidelines*.
16. Provision should be made for the adequate sealing of bores and containment of waste flowback and process water.
17. Closure of hydraulic fracturing sites should be subject to the implementation of post closure management plan which includes a requirement for ongoing monitoring of closed site.

References

EPA, WA 2005 *Guidance for the Assessment of Environmental Factors (Separation Distances between Industrial and Sensitive Land Uses) No. 3* EPA June 2005.

http://www.epa.wa.gov.au/docs/1840_GS3.pdf

Haluszczak, A., Rose, W. & Kump, L. (2013). Geochemical evaluation of flowback brine from Marcellus gas wells in Pennsylvania, USA. *Applied Geochemistry*, vol. 28, pp. 55-61.

Legislative Assembly, Education and Health Standing Committee, 2007, *Inquiry into the Cause and Extent of Lead Pollution in the Esperance Area*. Legislative Assembly, Parliament of Western Australia, Perth.

WA Department of Water (2010). *Draft approval framework for the use of non-drinking water in Western Australia. Urban developments*. Government of Western Australia.

<http://www.water.wa.gov.au/PublicationStore/first/95272.pdf>

WA Department of Water (2013). *Drinking Water*. Government of Western Australia. Accessed

<http://www.water.wa.gov.au/Managing+water/Drinking+water/default.aspx>