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Hydraulic fracturing of gas reserves

Hydraulic fracturing (also known as fracking) is a process that pumps fluids and other materials under high pressure into wells to open channels in the rock formations, increasing the flow of and allowing extraction of gas reserves.

The EPA notes that:

- there is emerging community interest in relation to hydraulic fracturing (fracking) proposals, however it also notes that there are material differences between Western Australian proposals and those in other jurisdictions;
- a number of trials involving fracking activities have been referred to the EPA for environmental impact assessment;
- in deciding whether to assess a proposal the EPA will determine the significance of the environmental impact; and
- the Department of Mines and Petroleum (DMP) is the lead agency for regulating the development of the gas industry.

Background

Development of “unconventional” gas reserves is expanding globally to meet the world’s energy needs. In addition to offshore gas reserves, unconventional gas reserves can also be found onshore, trapped in underground geological formations. Although previously difficult to extract, technological developments in the past 30 years in horizontal drilling and hydraulic fracturing have made these reserves accessible and commercially viable.

Fracking (also technically known as hydraulic fracture stimulation) is a process that uses fluids and other materials that are pumped under high pressure into wells to open channels in the rock formations, increasing the flow of and allowing extraction of gas reserves. ‘Shale’, ‘tight’ and ‘coal seam’ gas are terms used to describe unconventional gas obtained from coal seams and permeable rock formations such as tight sands (sandstones) and shale.

On present indications, unconventional gas and particularly shale gas is likely to be an important part of Western Australia’s energy future and there is likely to be an increasing number of unconventional gas projects being developed. The EPA has recently received a number of ‘proof of concept’ (or trials) referrals for projects involving fracking.

Unconventional gas resources

According to the Department of Mines and Petroleum (DMP), Western Australia has abundant shale and tight gas which differs from the coal seam gas resources being targeted in the eastern States and in the United States. The principal difference is that shale and tight gas resources are typically located more than 2,000 metres below the surface, whereas coal seam gas is generally found between 600-1,000 metres below the surface.

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An assessment of world shale gas resources by the United States Energy Information Agency has estimated that Western Australia holds the world's fifth largest reserves of shale gas in the Canning and Perth basins, representing about twice Western Australia's offshore gas reserves. It is estimated that Western Australia's unconventional gas reserves could provide enough energy to power a city of one million people for more than 5000 years.

Potential environmental impacts

The EPA acknowledges there is community interest about fracking. Some of this interest has arisen from reported adverse impacts associated with gas extraction projects in New South Wales, Queensland, and the United States.

Potential risks and impacts associated with fracking and unconventional gas development projects may include:

- water use;
- storage and disposal of produced water;
- potential chemical contamination of groundwater and surface waters;
- disruption to aquifer connectivity;
- fugitive greenhouse gas emissions;
- changes to land use and associated infrastructure development; and
- clearing of native vegetation.

The EPA considers that avoidance and mitigation of environmental risks and impacts and best practice management is important for projects where fracking is used. A significant separation between freshwater aquifers and target gas reserves will help limit the opportunity for chemical contamination of groundwater aquifers with fracking fluid. Ensuring cement casings meet best practice industry standards and maintaining well integrity will also help to reduce the future risk of blow-outs and potential impacts to groundwater and surface water systems. Adequate contingency plans are important in this regard.

The EPA also recognises that impacts associated with the full scale production of unconventional gas reserves need to be better understood in Western Australia. Broader cumulative impacts to the environment and communities from associated infrastructure such as gas processing hubs, pipelines, related infrastructure together with land use changes and access also need to be considered as projects progress past trial stages.

The EPA also considers that community confidence about the effective management of environmental impacts and risks associated with this industry is best achieved through open and transparent regulatory processes.

Regulation and assessment

In Western Australia, the DMP is the lead agency responsible for the regulation of unconventional gas activities. Shale, tight and coal seam gas are regulated using a similar process to conventional oil and gas activities under the *Petroleum and Geothermal Energy Resources Act 1967*, *Petroleum Pipelines Act 1969*, and the Schedule of Onshore Petroleum Exploration and Production Requirements 1991. The EPA notes that DMP is currently reviewing its regulatory arrangements based on best practice and domestic and international experiences to ensure it is well placed to manage the issues associated with this industry. The EPA will maintain a watching brief on the further development of these regulatory arrangements.

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Proponents intending to carry out drilling and fracking operations need to submit a number of applications to DMP, including:

- a drilling application;
- an environmental management plan; and
- a safety management plan.

DMP requires detailed information to be submitted in order to determine the acceptability of a fracturing program including:

- the physical location and size and scale of the fracturing program;
- the hydrogeological systems within the project area – including distances from the nearest aquifer(s);
- the volumes, management and disposal of water used;
- containment structures for extracted water;
- all chemical additives used in fracture fluid, including concentrations and toxicity;
- the integrity of well casings;
- fracture modelling and monitoring of fracking; and
- long term monitoring for determining whether chemical contamination is an issue.

Potential environmental impacts and risks identified for fracking projects will be assessed within DMP's regulatory framework in the first instance.

DMP will refer a proposal to the EPA if an activity is proposed in or within 500 metres of an environmentally sensitive area. DMP will also liaise with the EPA if a proposed activity is within two kilometres of a town site, the coastline or likely to impact a water resource area (including a water reserve, water catchment and groundwater protection area and declared or proposed water supply catchment area).

The EPA will determine whether to assess fracking related projects that are referred to it on a case-by-case basis, in the same manner as for other petroleum and mining proposals. This means that the EPA must make a decision as to whether the proposal is likely to have a significant effect on the environment and whether to assess the proposal, and if so, at what level of assessment. In determining whether a proposal is likely to have a significant effect on the environment the EPA will apply the significance test outlined in its *Environmental Impact Assessment (EIA) Administrative Procedures 2010*. It should be noted that this test includes consideration of the extent to which other statutory decision-making processes meet the EPA's objectives and the principles of EIA.

In recent determinations that the EPA would not assess a series of referred proposals, the EPA formed the view that, as the proposals were small scale 'proof of concept' proposals, they were not likely to have a significant impact on the environment. Further, the EPA considered that any potential impacts could be managed through the implementation of Environmental Management Plans that will be regulated by the Department of Mines and Petroleum.

The EPA will continue to work with DMP to ensure the community and industry has appropriate information and guidance.

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