

Fact Sheet - Risks of Shale Gas Exploration and Mining in the Northern Territory

- Over 90% of the Northern Territory is covered by petroleum exploration licences or applications, which may include exploration for shale gas. Shale gas production is a form of unconventional gas mining that uses techniques like horizontal drilling and hydraulic fracturing (fracking).
- It involves spatially intensive gasfields that spread progressively across landscapes. Shale gasfields involve the industrialisation of entire landscapes, with multiple wells at close proximity, plus a vast network of access roads, compressor stations, processing plants, holding ponds and collection pipelines.
- Gas companies claim that shale gas mining is nothing like the damaging coal seam gas operations on the east coast of Australia. However, shale gas mining involves similar large-scale industrialisation of rural landscapes, and is actually worse in terms of the amount of fracking required and the volumes of water and chemicals used.
- Both shale gas and CSG mining represent a major risk to water resources and both interfere substantially with farming businesses. Research from shale gas mining in the USA reveals many severe risks which are described and referenced below.

Shale gas mining processes require vast amounts of water

- Fracking involves pumping large volumes of water, chemicals and sand (or other 'proppants') into the ground to 'stimulate' gas flow.
- Fracking is an extremely water-intensive practice. A single frack operation on a shale gas well will use between 11 and 34 million litres of water, roughly 360 – 1100 truckloads¹. A typical horizontal well uses around 20 million litres², that's 8 Olympic swimming pools of water, per frack.
- Wells are often fracked on multiple occasions, sometimes up to ten times³, thereby multiplying the water use. Significant amounts of water are also used in drilling processes (around 1 million litres per well⁴).
- In Texas, extraction of water for fracking has contributed to serious problems of ground and surface water depletion during a drought conditions⁵. Towns and pastoral properties that must compete with fracking operators for scarce water supplies have been seriously affected.

Shale gas mining uses large amounts of chemicals in each fracking operation

- While chemical additives make up less than 2% of the total fracking fluid used, this still translates to large quantities. For example a single frack treatment in the US that used around 25 million litres of water, required more than 130 tonnes of chemicals (0.52% of the total fracking mixture by weight)⁶.
- Fracking compounds have been shown to include many hazardous substances, including carcinogens, neurotoxins, irritants/sensitisers, reproductive toxins and endocrine disruptors⁷.

Disposal of wastewater from shale drilling and fracking is a serious problem

- After the fracking process, 6-80% of the fracking mixture, referred to as 'flowback', is returned to the surface with additional substances from the shale rock. As much as 94% of injected fluid may remain in the ground⁸.
- 'Produced' water, underground water in or near the drilling area, also comes to the surface during shale gas production. For a typical shale gas well, daily produced water volumes range from 300 – 4,500 litres⁹.
- Flowback and produced water can contain heavy metals, naturally occurring radioactive materials (NORMs - including Radium, Thorium and Uranium), chemicals used in fracking and drilling, volatile and semi volatile organic compounds (VOC's) and high concentrations of salts¹⁰.

¹ UNEP Global Environmental Alert Service: *Gas Fracking: Can we safely squeeze the rocks?*

² WA Govt: *Natural gas from shale & gas fact sheet: water use & management.*

³ European Parliament, Economic & Scientific Policy Dept, *Impacts of shale gas and shale oil extraction on the environment and on human health.*

⁴ WA Govt: *Natural gas from shale & gas fact sheet: water use & management.*

⁵ *Frackers guzzle water as Texas goes thirsty:* <http://nation.time.com/2013/09/29/frackers-guzzle-water-as-texas-goes-thirsty/>; Western Organization of Resource Councils: *Watered Down: Oil & gas production & oversight in the west.*

⁶ *What's in my Frack Fluid?* <http://blog.skytruth.org/2012/05/small-example-of-fracking-industry.html>

⁷ National Toxics Network: *Toxic Chemicals in the Exploration and Production of Gas from Unconventional Sources.*

⁸ Hansen, Mulvaney & Betcher, *Water resources reporting and water footprint from Marcellus Shale development in West Virginia & Pennsylvania.*

⁹ Bill Chameides, *"Natural Gas, Hydrofracking and Safety: The Three Faces of Fracking Water,"* National Geographic, September 20, 2011.

¹⁰ Ibid

- Waste water from shale gas mining is likely to be reinjected into aquifer formations, trucked to holding ponds or partially 'treated' and released into waterways or reused.

Shale gas mining places water resources at risk

- Gas industry proponents will assert that because shale and tight gas extraction involves deeper strata, they are somehow safer than gas extraction from coal seams. This is deceptive. A recent European Commission Report¹¹ stated that there is an overall **high risk** of ground and surface water contamination resulting from gas operations involving fracking activities.
- Well casing failure is a serious issue with gas drilling. Industry documents show that up to 6-7% of new wells fail¹². After 20 years this failure rate may increase to 50%, as wells corrode and cement casings degrade¹³.
- Groundwater contamination can occur when well bore casings fail or are cracked during fracking operations. Gas and toxic flowback fluids can migrate from gas wells into aquifers through natural underground faults and fractures created during fracking operations.
- Recent research from the USA found higher levels of arsenic and other heavy metals, plus higher salinity, in water bores which were less than 3km from shale gas wells¹⁴. Other research has found increased methane concentrations in water bores closer to shale gas wells, creating an explosion hazard¹⁵.
- Surface water pollution can occur when there are accidental spills of fluids or solids at the surface, when well blow outs occur, and through discharge of insufficiently treated waste water into waterways. Studies from Duke University in the US have found high levels of radioactivity in a creek used for fracking wastewater disposal¹⁶.
- There is increasing evidence from across the US of significant depletion and contamination of water resources and waste management issues from unconventional gas operations^{17,18}.

Shale gas operations can have serious consequences for human and animal health

- Communities living near gasfields in the US have reported serious health effects since the gas companies moved in¹⁹. These conditions include serious respiratory ailments, nose throat and eye irritations and neurological illnesses²⁰.
- A 2012 case study in the US found serious evidence of harm to domestic stock from shale gas drilling waste contamination, including cattle deaths, stillbirths and reproductive problems²¹.

Landholders should have the right to say NO to gasfield development on their properties

Lock the Gate is a national alliance of farmers and community groups who aim to protect our agricultural and environmental resources from irresponsible mining. Landholders are key stakeholders in any resource extraction activities and understand local land management issues. Whether freehold or lease, *Lock the Gate* believes that landholders should have the right to say 'No' to gas operations on their properties.

For more information about shale gas mining in the NT, please contact Emma Murphy on 0488 208 235 or emmainsnow@gmail.com. You can join Lock the Gate, or get more information on our website: www.lockthegate.org.au.

¹¹ Broomfield Mark, *Support to the identification of potential risks for the environment and human health arising from hydrocarbons operations involving hydraulic fracturing in Europe*. AEA Technology, 2012.

¹² ANTHONY R. INGRAFFEA, PH.D., P.E., *FLUID MIGRATION MECHANISMS DUE TO FAULTY WELL DESIGN AND/OR CONSTRUCTION*.

¹³ *Marcellus Shale Exposed*, Antony Ingraffea, <http://www.youtube.com/watch?v=7DK3fODCZ3w>

¹⁴ Fontenot et al 2013, An Evaluation of Water Quality in Private Drinking Water Wells near Natural Gas Extraction Sites in the Barnett Shale Formation. *Environ. Sci. Technol.* 2013. 47 (17) pp 10032-10040

¹⁵ Osborn et al 2013. *Methane contamination of drinking water accompanying gas-well drilling and hydraulic fracturing*. PNAS, May 17 2011.

¹⁶ Warner et al, *Impacts of Shale Gas Wastewater Disposal on Water Quality in Western Pennsylvania*, *Environ. Sci. Technol.*, 2013, 47 (20), pp 11849–11857

¹⁷ Western Organization of Resource Councils: *Watered Down: Oil & gas production & oversight in the west*.

¹⁸ Hansen, Mulvaney & Betcher, *Water resources reporting and water footprint from Marcellus Shale development in West Virginia & Pennsylvania*

¹⁹ Centre for Environmental Health: *Toxic and Dirty Secrets: The Truth about Fracking and Your Family's Health*.

²⁰ National Toxics Network: *Toxic Chemicals in the Exploration and Production of Gas from Unconventional Sources*.

²¹ MICHELLE BAMBERGER, ROBERT E. OSWALD, *IMPACTS OF GAS DRILLING ON HUMAN AND ANIMAL HEALTH*.