Hydraulic Fracturing (Fracking)

Hydraulic fracturing involves injecting large quantities of water with chemical additives at high pressure into a geologic formation (USA EPA). The pressure exceeds the rock strength, opening or enlarging fractures in the rock. As the formation is fractured, a "propping agent" such as sand is pumped into the fractures to keep them from closing as the pumping pressure is released. As fracturing fluids are returned to the surface, natural gas will flow from pores and fractures in the rock into the well.

Fracking allows access to formerly inaccessible or uneconomic hydrocarbon resources (unconventional). According to Tag Oil, fracking deep in the Mt Messenger formation boosted daily production rates by 365 percent.

Wells used for hydraulic fracturing are drilled vertically, vertically and horizontally, or directionally. Wells may extend to depths several kilometres below the surface, with a horizontal section over 1 km long. Water used for fracturing fluids is acquired from surface or ground water in the local area. A single horizontal well in a shale formation may require 7 – 19 million litres of water to fracture.

Waste ("produced") water after fracking (15-80% of the original volume) may be disposed of in underground injection wells, discharged into streams after treatment or applied to land surfaces (e.g. land-farming, land-spreading).

Myth Buster

Myth 1: Aquifers (ground water) are not affected because they are very shallow in NZ or they are salty deeper down, and besides, companies encase drill pipes with concrete where they go through aquifers.

Truth: Over 1,000 cases of ground water contamination associated with fracking across six states in the US have been documented, many can be traced back to shoddy cement jobs. Fracking related incidences are spreading across the country.

An Australian government report revealed that half of the gas well heads tested were leaking methane gas. A local rig worker in Taranaki revealed that often when their teams were drilling through aquifers they could suddenly lose all their drill fluid, after which they simply pulled out and drilled again.

Another major issue is the amount of water being extracted for fracking. In Australia, prime agricultural lands and the Great Artesian Basin with its underground water reserves are under threat as 25-35,000 wells are expected to be drilled in Queensland alone. One project recently approved will extract, at its peak, 170 million litres of water per day. Farmers have reported substantial (2/3 in one case) lowering of their bore water levels. Australia's peak advisory body on water issues has warned the industry could have a significant impact on surface and groundwater if not managed properly.

Indeed the conditions under which many non-notified resource consents are issued in NZ, e.g. drilling waste discharge is permitted merely 25 or 30 metres from water bodies (any surface water, spring, groundwater supply bore) or property boundaries, are real cause for concern to both human and environmental health.

Myth 2:. The chemicals in fracking fluids are perfectly safe as they are similar to those found in household and food products such as ice cream.

Truth: This claim is extremely misleading. Fracking fluids include chemicals and additives (e.g. viscosifiers, surfactants, pH control agents) as well as biocides that inhibit biological fouling and erosion. Many of these chemicals are known carcinogens (e.g. benzene), neural toxins or harmful to foetal development. The USA EPA explained, *"Contaminants of concern to drinking water include fracturing fluid chemicals and degradation products and naturally occurring materials in the geologic formation (e.g. metals, radionuclides) that are mobilized and brought to the surface during the hydraulic fracturing process."*

e.g. BTEX (Benzene, Toluene, Ethyl Benzene and Xylene), volatile components commonly associated with petroleum products, are used in hydraulic fracturing. The fracking process can also release naturally occurring BTEX from natural gas reservoirs. Because of their polarity, solubility and toxicity, BTEX chemicals can enter the soil and groundwater systems and cause serious, acute and chronic health impacts.

Pennsylvania Department of Environment Protection records showed that some public water utilities downstream from plants treating wastewater have struggled with unacceptable levels of trihalomethanes, carcinogens sometimes linked to drilling waste. In Queensland Kingaroy area where coal seam gas exploration has proliferated, carcinogenic benzene and toluene were found in cattle fat.

In Australia, the National Toxins Network found that only 2 out of the 23 most commonly used fracking chemicals have been assessed by NICNAS (national scheme). Moreover, little is known about the cumulative effects of chemical "cocktails" and in the measure of thousands of tonnes.

In NZ, the list of chemicals used in fracking is not yet freely available. Ministry for Environment(MFE) explained that companies are not required to notify them re the use of hazardous substances once they are approved under HSNO Act. Taranaki Regional Council (TRC) and Ministry of Economic Development (MED) both denied responsibility for providing the list. MED's advice is to contact the companies.

Myth 3: Fracking occurs much deeper underground in NZ than in the US and the rock here is different.

Truth: Fracking occurs at a range of depths depending on the shale formation. e.g. 1,400-1,900 m within the NZ Mt. Messenger Formation (deeper in the Kapuni Sands Formation); 1,000-2,500 m within the US Marcellus Formation (shallower in W Virginia). According to Tag Oil, porosities and permeabilities found within the multiple Kapuni Sands Formation zones are analogous to prolific tight-sand formations found in Germany, Holland, the North Sea and numerous basins in the U.S. and Canada.

Myth 4: Everything is rigorously controlled by government regulations and the regional council through the Resource Management Act (RMA).

Truth: A recent government review concluded, *"…by comparison with leading petroleum producing nations, New Zealand has extremely limited resources, both in terms of technical expertise/experience and in terms of the financial resources available to regulators for activities such as Safety Case verification/acceptance, HSE monitoring and enforcement of compliance."* MED, 2010. Alarmingly, NZ has only one inspector for all its offshore and onshore petroleum installations. Moreover, the MED (Crown Minerals) does not take into consideration HSE (health, safety, environment) issues when allocating permits.

Regional and local councils are responsible for enforcing the RMA following National Environmental Standards set out by MFE. To ensure consistent minimum standards are maintained throughout NZ, councils may impose stricter standards.

The reality however, is very different. In a number of TRC compliance monitoring reports, the council allowed companies (e.g. landfarm operators) to vary their consent conditions because loading limits (e.g. chloride and nitrogen) are seldom complied with. In at least one case, hydrocarbon, sodium and conductivity exceeded the consent limits (BTEX was not tested), barium level was twice that recommended, several incidences were reported, and cows were allowed to graze on a paddock where drilling mud had been applied. Despite all these, TRC concluded that the operation had achieved "a good level of environmental performance and compliance with the resource consents", and reduced the level of inspections and soil monitoring.

Myth 5: Natural Gas is a clean energy source. It will substantially reduce NZ's greenhouse gas emission and foreign oil import, and is good for the economy.

Truth: A recent Cornell University study revealed that the greenhouse gas footprint from gas extraction through hydraulic fracturing is far higher because the "fugitive" methane emissions at the fracking sites are greater than releases from conventional gas wells. Fugitive methane is also released from other steps in the process – transport, storage, etc. The study concluded that shale gas ultimately brings climate consequences comparable to coal over a century, and worse than coal over two decades.

Natural gas development from unconventional sources will not reduce our dependence on foreign import because the bulk of gas is destined for export. NZ relies primarily on renewable resources for electricity. Natural gas is little used in transport, so we will continue to import petrol and diesel.

In terms of the economy, tourism earns $18.6 billion a year and thrives on a clean-green image. Our farming communities contribute to the nation's second largest export earnings while the food and beverage industry, dependent also on a clean and healthy environment, employs one in five workers.

Gas extraction involving fracking is socially, environmentally and economically irresponsible. Such technology is so risky that France, New York State, South Africa and Quebec have imposed a moratorium. In Arkansus, unprecedented increase in earthquakes may be linked to gas drilling, fracking and deepwell injection of drilling waste. Aggressive gas drilling in seismically active NZ has every likelihood to cause unthinkable disasters. NZ government has the duty of care to look after its people and the precious water, land and air on which we all depend.

Prepared by Climate Justice Taranaki, 20 April 2011
For more information, visit:
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