

Agenda Memorandum

Date 19 July 2012



**Memorandum to
Chairperson and Members
Policy and Planning Committee**

**Subject: Royal Society recommendations re
hydraulic fracturing in the UK, and NZ
practice**

Item: Late Item

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Purpose

The purpose of this memorandum is to provide members with a regional and national perspective on the recommendations made by the Royal Society (UK) within the report *Shale gas extraction in the UK: a review of hydraulic fracturing* (see Item 8 in this agenda).

Executive summary

This Council was approached by the Royal Society of New Zealand (RSNZ) to review the recommendations contained in the report referenced above. The study presented recommendations in 10 major themes for the UK, and the Royal Society (NZ) is interested in making an objective and well-considered statement about the state of management and control of hydraulic fracturing in New Zealand. Members will be aware, as is the RSNZ, of a high level of discussion around the issue, not all of which has been well-grounded.

This Council also sought comment from the Ministry of Business, Innovation and Economics (MBIE) which incorporates the former Department of Labour) in preparing the review.

This memorandum presents the applicability and degree of application of the Royal Society (UK)'s recommendations. In short it shows that the Council and NZ are well-positioned to demonstrate good practice in management and regulation.

Recommendations

That the Taranaki Regional Council:

1. receives the memorandum '*Royal Society recommendations re hydraulic fracturing in the UK, and NZ practice*'

2. notes the finding of a review of regional management and control against recommendations by the Royal Society (UK), that the Council and New Zealand are demonstrating good practice in the management and regulation of hydraulic fracturing.

Background

The UK's chief scientific advisor asked the Royal Society and the Royal Academy of Engineering to review the scientific and engineering evidence related to risks associated with the practice of hydraulic fracturing. The report presented within item 8 presents their analysis of environmental and health and safety risks.

The report finds '*the health, safety and environmental risks associated with hydraulic fracturing (often termed 'fracking') as a means to extract shale gas can be managed effectively in the UK as long as operational best practices are implemented and enforced through regulation.*' This is a very significant and authoritative statement on the subject, which should be allowed to fully inform the current national discussion.

As noted, the report also contains a series of recommendations, alongside its finding as reported above.

Discussion

The Royal Society of New Zealand has sought the views of this Council as to how relevant and applicable the UK report's recommendations are to this country's management of hydraulic fracturing. In responding, Council staff also sought to incorporate input from MBIE so that the review would be comprehensive. Committee Members will be aware that the Parliamentary Commissioner for the Environment is undertaking an investigation also, with a report expected perhaps by the end of this year.

In considering the UK Royal Society recommendations, context should be kept in mind. The extraction of shale gas (the subject of the UK study) generally occurs at much shallower depths, in formations of different structure and composition, and with discharge of much greater volumes of produced water, than the practice of hydrocarbon gas and condensate recovery in Taranaki. There is thus a different risk profile. Accordingly, a management and operational regime that is suitable for shale gas extraction would, all other things being equal, afford an even more secure regime for hydraulic fracturing in Taranaki.

The review of current regional and national practice in New Zealand, against the Royal Society recommendations, suggests that the Council and New Zealand are well-positioned to demonstrate good practice and risk minimisation and management for hydraulic fracturing.

The details of the UK recommendations and their corresponding status in New Zealand, are set out in the table below.

It is also important to note that shales have a very low permeability range for a producing formation as opposed to the tight gas sandstone reservoirs that are subject to hydraulic fracturing in Taranaki. This means greater use of energy and fluids in the hydraulic fracturing operation.

The Health and Safety in Employment (Petroleum Exploration and Extraction) Regs 1999 [the HSE(PEE)R], administered by the Labour Group, Ministry of Business, Innovation, and Employment [MBIE (Labour) – formerly the Department of Labour (DoL)], are currently under review.

Recommendations for Hydraulic Fracturing (HF)

NZ Royal Society Best Practice Checklist and TRC response

July 2012

Context: shale gas extraction by fracturing, as recently reviewed by the Royal Society (UK), carries a comparatively higher degree of risk than hydraulic fracturing practised within Taranaki. For example, the former is usually carried out at much shallower depths, involves long horizontal wells, very low permeability formations, and requires greater water use and the extraction and disposal of much greater quantities of produced wastewaters. From a risk management perspective, a management regime suitable for shale gas extraction would therefore offer a considerably greater margin of security if applied to hydraulic fracturing practised within Taranaki.

1. Detection of groundwater contamination

(a) Baseline surveys of methane and other contaminants	TRC supports as good practice. Addressed in consent conditions with the requirement for a baseline and on going groundwater monitoring programme. TRC generally undertakes the monitoring for the consent holder. Note technology allows distinction of biogenic (gas from shallow organic formations) and thermogenic (gas from decomposition of buried organic matter at depth, i.e. fossil fuels) methane.
(b) Site specific monitoring of methane and other contaminants before and after operations	TRC supports as good practice. Methane is found naturally in shallow groundwater in Taranaki, as consequence of swamp decomposition (biogenic) and natural

	<p>hydrocarbon 'seeps' (thermogenic). Addressed in consent conditions with the requirement for a baseline and on- going groundwater monitoring programme. TRC generally undertakes the monitoring for the consent holder. Note technology allows distinction of biogenic (gas from shallow organic formations) and thermogenic (gas from decomposition of buried organic matter at depth, i.e. fossil fuels) methane.</p>
(c) Develop method for monitoring abandoned wells	<p>Monitoring of an abandoned well is not something that the Labour Group, Ministry of Business, Innovation, and Employment intend to address going forward as it makes no material difference to the safety of workers if it is no longer a place of work, i.e. the drilling unit or production installation is no longer in the vicinity.</p> <p>A matter that will be addressed as part of the Council's regional plan review process.</p>
(d) Data collected by operators submitted to regulator	<p>Addressed in consent conditions with a requirement for HF operational and well condition data to be submitted in a post HF report</p>
2. To ensure well integrity	
(a) Ensure independence of the well examiner from the operator	<p>Under Reg 15 of the Health and Safety in Employment (Petroleum Exploration and Extraction) Regs 1999 [the HSE(PEE)R] administered by the Labour Group, Ministry of Business, Innovation, and Employment [MBIE (Labour) – formerly the Department of Labour (DoL)]– an employer must ensure that a competent person inspects the well drilling operation before commencement and on a daily basis once the operation commences.</p>

	<p>MBIE (Labour) is currently undertaking a review of the HSE(PEE)R. One of the review proposals is for operators to implement an examination scheme for each and every well to ensure that it is designed, constructed, and maintained in a safe condition throughout the life cycle of the well. MBIE (Labour) envisages that the examination would be carried out by someone who is competent to do so and independent of line management for the well. Similar requirements are placed on operators of offshore installations in the UK.</p> <p>The independence of the well examiner from the operator is not addressed.</p>
(b) Well designs should be reviewed by well examiner from H & S and environmental views	Refer to comments at 2(a).
(c) Well examiner should carry out onsite inspections	Refer to comments at 2(a).
(d) Operators should ensure that well integrity tests are carried out	TRC supports as good practice. With respect to potential discharge into the environment, addressed in consent condition with a requirement for well and equipment pressure testing prior to HF operation
(e) Results of well tests should be submitted to NZ equivalent of DECC (MfE?)	TRC supports as good practice. Addressed in consent condition with a requirement to supply this data to the Council
3. To mitigate induced seismicity	
(a) Operators should carry out site specific surveys	TRC supports as good practice. GNS seismic study commissioned by the Council showed this was not an issue in the region. It should be noted that induced seismicity is so low, that only largest conceivable events could register on regional seismic monitoring

	networks (and would still be orders of magnitude below human awareness or perception). However, there is generally some consideration of this matter by consent applicants in any case.
(b) Monitoring of seismicity before, during and after operations	TRC supports as good practice. See above. There is a regional volcano-seismic monitoring network in place in the Taranaki region that would show any impacts of HF operations that were more than negligible (and still orders of magnitude below human perception). NZ has the GeoNet and GNS monitoring and assessment capabilities to call on in the assessment and measurement of seismic impacts.
(c) Traffic light monitoring system	See above
(d) MfE? To consider how induced seismicity is to be regulated	RMA allows seismic effects of an HF operation to be considered by councils. TRC has commissioned independent authoritative work on the issue, as noted above, and this matter should be assessed in resource consent applications if HF operations spread to other regions. Do not think a national assessment would add much value as need more of a region-specific assessment of risk and monitoring requirements.
4. To detect potential leakages of gas	
(a) Operators to monitor potential leakages before, during and after operations	TRC supports as good practice. Has the baseline and on going groundwater survey of methane, and pressure testing of the well and equipment prior to an HF operation, as requirement in the consent
(b) Data to be submitted to regulator to inform wider assessments	TRC supports as good practice. Monitoring data is submitted to the Council and publically reported annually in compliance monitoring reports (and any non-compliance is reported publicly every 6 weeks)

5. Water managed in an integrated way	
(a) Minimise water use avoid abstracting water from under stress supplies	Water is taken from municipal supplies in Taranaki so no water use issues. This would be a standard matter for consideration by a consenting authority anywhere in NZ and the impact of the abstraction would be a function of the allocation pressure on the resource
(b) Wastewater recycled and reused where possible	Not an issue as no water supply issues and produced wastewater (return fluids) are not recycled
(c) Options for treating and disposing of wastes should be planned from the outset	TRC supports as good practice. Proposed disposal method for produced wastes (return fluids) should be covered in the HF consent application and activity monitored by the Council.
6. Manage environmental risks	
(a) Environmental Risk Assessment should be mandatory for all operations	<p>TRC supports as good practice. In NZ, RMA provides the framework for consideration of environmental effects/risks. The definition of environmental effect in the RMA is broad. Adverse effects are identified and measures to avoid, remedy or mitigate these effects are presented by applicants for resource consent. There is no comprehensive risk assessment per se.</p> <p>The controls (to prevent and limit the consequences of a major accident) that an employer details in the safety case they submit to the Secretary of Labour before the commencement of operations will often prevent and/or reduce harm to the environment as well (although this is not the primary purpose of the safety case). While the safety case regime does not currently apply to onshore petroleum operations, the review of the HSE(PEE)R is seeking to change this.</p>

(b) The ERA should assess risks across the entire lifecycle of operation	See 6(a)
7. Best practice for risk management	
(a) Operators carry out goal based risk assessments according to the principle of reducing risks to As Low As Reasonably Practicable (ALARP)	<p>Regulation 22 of the HSE(PEE)R requires offshore petroleum installations to submit a safety case to the Secretary of Labour before the commencement of operations. The safety case requires the employer to identify, assess, and put controls in place to manage all hazards with the potential to cause a major accident. While the safety case regime does not currently apply to onshore petroleum operations, the review of the HSE(PEE)R is seeking to change this.</p> <p>With regard to environmental risk, the TRC routinely adopts a 'best practicable option' approach (as defined in the RMA), capturing similar concepts as ALARP.</p>
(b) Operators ensure that mechanisms are put in place to audit the processes	As part of their safety case employers are required to provide a description of their safety management system, how it will be implemented, and the audit procedures that will be adopted
(c) Assessments should be submitted to regulators	As mentioned previously, employers are required to submit their safety case to the Secretary of Labour prior to the commencement of operations
(d) Mechanisms should be put in place for reporting well failures and other incidents	<p>Regulation 19 of the HSE(PEE)R requires employers to notify the Secretary of Labour of any failure of any part of the primary pressure containment system of the well, and any steps that will be taken to remedy the failure.</p> <p>The review of the HSE(PEE)R proposes to introduce a more comprehensive 'dangerous occurrence' reporting regime that is more akin to requirements imposed on offshore</p>

	<p>operations in the UK and Australia.</p> <p>Environmental reporting: TRC implements comprehensive and frequent monitoring, as well as maintaining a 24-hour public response service for complaints; and industry practices a high degree of self-reporting already</p>
<p>8. UK regulators determine requirements to regulate a shale gas industry. Skill gaps and training should be identified</p> <p>Regulation 6(2)(c) of the HSE(PEE)R requires an employer to ensure that the manager appointed to supervise the well operation has practical experience in well drilling and a sound knowledge of well control methods.</p> <p>The review of the HSE(PEE)R proposes to amend safety case regime so that employers would be required to demonstrate (in their safety case) that each member of the workforce at the installation has, or will have, the necessary skills, training, and ability to meet their responsibilities and perform their job safely and effectively.</p> <p>As previously mentioned, the review also proposes extending the safety case regime to onshore operations.</p> <p>Environmental /RMA: Councils exchanging information on good practice in regulation and monitoring, with expert advice obtained already (eg in seismicity, geohydrology, and regulation practice)</p>	
<p>9. Co-ordination of numerous bodies with regulatory responsibilities. Single body should take lead</p> <p>NZ has set up an HS&E Steering Team (involving MBIE, Transport, regional councils, EPA, MfE, Doc, MNZ) specifically to address coordination and best practice.</p> <p>Note : Labour Group, MBIE (workplace health and safety), EPA (management hazardous substances), district and regional councils (environmental effects; eg emissions to air,</p>	

<p>discharges to land, water takes, noise, light, traffic movements) are involved in regulating HF. There is no single supervising body as may exist overseas.</p>	
<p>(a) Clarify roles and responsibilities</p>	<p>TRC has a working relationship with MBIE (Labour) officers in New Plymouth regarding their HSE and HSNO responsibilities. Have a working relationship with district councils in terms of their responsibilities. Have a work shop planned with 3 district councils to discuss any regulatory issues for the oil and gas industry in the next month. May hold a workshop with other agencies involved in HF to ensure a coherent and integrated approach to regulation.</p>
<p>(b) Develop mechanisms to support integrated ways of working</p>	<p>An integrated approach to monitoring RMA and HSNO at well sites and production stations was in place until 2011, under a contract between the Council and former DoL. Opportunity for an integrated approach lost when the (then) DoL cancelled the contract. See above for national co-ordination.</p>
<p>(c) Formal mechanisms to share information</p>	<p>No (but note above). Extensive informal networks of key agencies and players.</p>
<p>(d) Joined-up engagement of local communities</p>	<p>No joint regulatory authority community engagement given the different regulatory regimes in place, some of which allow for public input and others do not. Consent holders generally have good relationships with well site neighbours and keep them informed about well site activities, including HF, and answer any questions. RMA encourages consultation on site by site basis. TRC provides high level of reporting back to local communities. RMA provides for extensive public consultation at time of preparing regional policy statements and regional plans that set the 'rules' for HF.</p>
<p>(e) Mechanisms to learn from operational</p>	<p>Council makes regular assessment of</p>

and regulatory best practise internationally	overseas literature, reports, studies, regulation and legislation, news announcements etc via the web and notification services. Council commissioned GNS to review HF regulatory practices overseas. Senior council officer intends to undertake an overseas HF study tour, following on from previous international contacts and studies
<p>10. Research sector should consider including shale gas extraction in their research programmes. Priorities should include into the public acceptability of the extraction and use of shale gas.</p> <p>TRC has already commissioned analytical review of original data (eg seismic records). Applications for HF research, that will inform the NZ situation, are being made.</p>	

Note: Contingency planning for well site spills is a requirement of the storm water consent , issued by the regional council, and also applies to HF operations on well sites. Having a contingency plan in place is a matter of best practice identified by overseas commentators for HF operations.

Decision-making considerations

Part 6 (Planning, decision-making and accountability) of the Local Government Act 2002 has been considered and documented in the preparation of this agenda item. The recommendations made in this item comply with the decision-making obligations of the Act.

Financial considerations—LTP/Annual plan

This memorandum and the associated recommendations are consistent with the Council’s adopted Long-Term Plan and estimates. Any financial information included in this memorandum has been prepared in accordance with generally accepted accounting practice.

Policy considerations

This memorandum and the associated recommendations are consistent with the policy documents and positions adopted by this Council under various legislative frameworks including, but not restricted to, the Local Government Act 2002, the Resource Management Act 1991 and the Biosecurity Act 1993.

Legal considerations

This memorandum and the associated recommendations comply with the appropriate statutory requirements imposed upon the Council.