

Northern Land Council

ABN 56 327 515 336

Address all correspondence to:
CHAIRMAN
GPO Box 1222
DARWIN NT 0801

45 Mitchell Street, Darwin NT 0800
Phone: (08) 8920 5100
Fax: (08) 8945 2633
Freecall: 1800 645 299

10 September 2014

Our Ref: DS20/NO1

Dr Alan Hawke
Commissioner
Inquiry into Hydraulic Fracturing
Via Department of Mines and Energy
Northern Territory Government
GPO Box 4550
DARWIN NT 0801

Dear Dr Hawke,

NLC Addendum to the Inquiry into Hydraulic Fracturing

The NLC wishes to thank you for accepting further comments from the NLC and for approving an extension of time to allow the NLC to submit additional comments by 10 September 2014.

Please find attached NLC's Addendum which provides additional comments to the NLC submission lodged with your office on 30 June 2014.

Yours sincerely,

Joe Morrison
CHIEF EXECUTIVE OFFICER

BORROLOOLA
PO Box 453
Borroloola NT 0854
Ph: (08) 8975 8848
Fax: (08) 8975 8745

JABIRU
PO Box 18
Jabiru NT 0886
Ph: (08) 8938 3000
Fax: (08) 8979 2650

KATHERINE
PO Box 396
Katherine NT 0851
Ph: (08) 8971 9899
Fax: (08) 8972 2190

NGUKURR
PMB 85
via Katherine NT 0851
Ph: (08) 8975 4755
Fax: (08) 8975 4601

NHULUNBUY
PO Box 820
Nhulunbuy NT 0881
Ph: (08) 8986 8500
Fax: (08) 8987 1334

PALMERSTON
PO Box 1249
Palmerston NT 0831
Ph: (08) 8931 5500
Fax: (08) 8931 1875

TENNANT CREEK
PO Box 55
Tennant Creek NT 0861
Ph: (08) 8962 1884
Fax: (08) 8962 1636

TIMBER CREEK
43 Wilson Street
via Katherine NT 0852
Ph: (08) 8975 0789
Fax: (08) 8975 0664



Addendum to Northern Land Council Submission

Northern Territory Government Public Inquiry into Hydraulic Fracturing (August 2014)

Risks associated with the extraction of petroleum from beyond prescribed boundaries.

This addendum discusses the risk of extraction of petroleum from outside operational areas prescribed by Exploration Permits (EPs), Onshore Production Leases (OLs), or Onshore Production Licences (Ls), including from non-consent areas or sacred sites.

NLC Submission

In June 2014 the Northern Land Council (NLC) lodged a submission to the NT Government Inquiry into Hydraulic Fracturing (now available on line at http://www.hydraulicfracturinginquiry.nt.gov.au/public_submissions.html) (NLC Submission). This Addendum raises an additional point to the initial NLC Submission, and should be read in conjunction with it; specifically Part 1 ("About the Northern Land Council") and Part 3 ("Northern Land Council Interest"). These parts describe the functions and responsibilities of the NLC with specific reference to the administration of petroleum project proposals on lands subject to the Native Title and Aboriginal Land Rights Acts.

NT Government Inquiry into Hydraulic Fracturing

The Inquiry into Hydraulic Fracturing is subject to a Terms of Reference (TOR). The issue raised in this Addendum is of specific relevance to Terms of Reference 4, 5, 6, and 7a) (below).

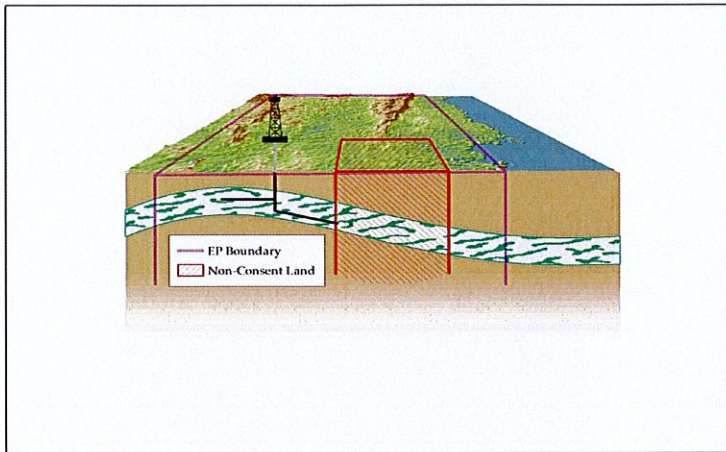
4. The potential for multiple well pads to reduce or enhance the risks of environmental impacts.
5. The relationship between environmental outcomes of hydraulic fracturing of shale petroleum deposits with geology ...
6. The potential for regional and area variations of the risk of environmental impacts from hydraulic fracturing in the Northern Territory.
7. Effective methods for mitigating potential environment impacts before, during and after hydraulic fracturing with reference to:
 - a. the selection of sites for wells;

The NT Environmental Assessment Act (2013) defines environment as follows:

*"**environment** means all aspects of the surroundings of man [sic] including the physical, biological, economic, cultural and social aspects." [emphasis added]*

On this basis, the NLC interprets the Inquiry's TOR to incorporate consideration of the economic, cultural and social dimensions of the environment, and sees fit to raise and address matters pertaining to economic, cultural and social impacts and risks.

Discussion



In the course of carrying out its statutory duties, the NLC conducts consultations with Traditional Land Owners in relation to oil and gas exploration (including propels that will apply hydraulic fracturing). In the course of these consultations, the NLC has noted the following questions are often asked by Traditional Owners:

- Is it possible for petroleum operators to access a deposit from a tenement that has been subject to negotiations with traditional Aboriginal land owners, and to extract petroleum from beneath neighbouring lands where negotiations have not concluded or where consent has not been granted?
- How are the horizontal extents of underground drilling and induced fracturing determined, monitored and regulated?

Petroleum proposals on lands subject to Native Title and Aboriginal Land Rights

A petroleum tenement may cover a large area, distinct parts of which belong to numerous different Aboriginal clans. Where the Land Rights Act applies, affected adjacent landholding clans may elect not to consent to a project proposal, rendering the subsurface area unavailable for access from above (non-consent lands).

The Northern Territory Sacred Sites Act is administered by the Aboriginal Areas Protection Authority (AAPA), and it affords Aboriginal people the right to record protect and register sacred sites on any land or waters within the NT. Sacred sites and their features can extend below the ground (or water) surface and are often associated with water, the flow of water and/or subterranean rocks or rock formations. These subterranean features may be the actual and/or conceptual extensions of surface sacred site features such as billabongs, rivers or hills. Unauthorised works on, desecration of, and entering and/or remaining on a sacred site are offences under this Act. In practice to protect sacred sites AAPA consults Aboriginal site custodians about proposed works and provides operators with a clearance or Authority Certificate detailing "restricted work areas" around sites and providing

any conditions under which works may or may not occur. Authority Certificates are spatially limited to the areas applied for by developers so cannot anticipate, consider or provide indemnity for “off-lease” or off-Certificate impacts from works conducted within areas covered by a Certificate.

The AAPA has recorded and registered many sites and areas that have subterranean features. Most commonly these follow rivers and aquifers such as the Tindal and Ooloo aquifers on the Roper and Daly rivers respectively that are associated with many registered and recorded sacred sites. In other areas the subterranean domain is a zone traversed by Dreaming tracks and inhabited by Creation Ancestors often communicating across large areas and connecting with or emerging to form sacred sites and site features on the surface.

An EP, OL, or L boundary reflects an area within which Traditional Owners have been consulted with and have agreed to operations subject to certain provisions. Within such a tenement operations are excluded from sacred sites or areas of cultural significance.

Petroleum operations, risks and potential impacts

It is possible for horizontal wells, or for hydraulically induced fractures, to extend beyond the boundaries of an EP, OL, or an L. Inside of these tenements, it is possible that drilling and induced fracturing activity may occur beneath non-consent or restricted work areas, including sacred sites. The material risk that such an event may occur varies according to a range of factors not presently clear, however should such an event occur the likely impacts are significantly detrimental to the interests of Indigenous people. Further information and a thorough risk analysis be made available to the Land Council.

In the case of wells or induced fractures affecting sacred sites, there is potential for detriment to;

- the spiritual and physical wellbeing of site custodians,
- the cultural values of the surrounding country and elements of the environment (particular species or places), and
- certain cultural or customary practices of landowning clans.

Should a well or induced fractures extract petroleum from beyond the boundaries of a tenement, such activity may;

- undermine the rights of neighbouring Aboriginal land owning groups to negotiate benefits from such resource extraction,
- strip land owning groups of future economic benefit via future extraction of the resource,
- generate conflict between land owning groups should one clan benefit from the extraction of petroleum resources extracted from a neighbouring clans' country,
- undermine the confidence of landowners in the operator, the industry more broadly, and industry regulators, and
- cause land owners to seek compensation for loss of an economic resource.

Additionally, the perceived risk of such an event occurring may weigh on the decisions of Aboriginal landowning groups when they consider petroleum project proposals: Groups may refuse consent where it would otherwise be granted to avert the risk of conflict with neighbours. Conversely,

groups may consent to proposals they would otherwise refute, to avert the risk of having their petroleum resources extracted via active neighbouring tenements.

Regulation

The NLC understands that the Petroleum Act defines an exploration permit area as *“the area constituted by the blocks that are the subject of an exploration permit”*. Exploration may only occur pursuant to an exploration permit (defined by the specific graticular portions an operator is granted). Section 105 of the Act provides that *“A person shall not explore for, or engage in operations for the recovery of, petroleum unless the person does so under and in accordance with an exploration permit, retention licence or production licence”*, and so exploration beyond the blocks subject to permit is an offence.

NLC notes that emerging well technology enables access to significant areas of subterranean petroleum reserves; for example a multi-well pad site operated by Encana in Colorado is 1.86 hectares in size above surface, and apparently accessed 259 hectares of underground resource (Hicks, B. 2012). The length of the horizontal drill shafts may extend up to 3km, and induced fracturing is understood to typically extend beyond drill shafts for no more than 100 meters, however the variables affecting the extent of fracture propagation are not presently clear and fractures may extend significantly further than 100 meters. The extent of induced fractures is calculated based on numerous assumptions including (but perhaps not limited to) rock type, hardness and strength, strata pressure, and pre-existing faults. As such, it is understood the extent of fractures cannot be engineered with absolute accuracy.

Most discussion of the growth of fracture profiles relates to vertical fractures; information on the growth of induced horizontal fractures may contribute to analysis of the risk of extract beyond prescribed boundaries. Fracture orientation varies according to the stress regime of the surrounding geology; it is generally understood that fractures *“... will propagate parallel to the greatest principal stress and perpendicular to the plane of the least principle stress”* (Economides and Martin, 2007). At shallower depth fractures orientate horizontally, and at depth fractures orientate vertically. Induced fracturing of shallower reserves in the Northern Territory may carry a higher risk of breaching operational boundaries. It is known, for example that the Georgina Basin’s target horizons range from 300m to 1000m (CSIRO, 2012), and so include shallower reserves potentially subject to higher risk.

NLC understands that options for monitoring fracture profiles include (but may not be limited to) the application of microseismic monitoring, radioactive tracers, or radioactive isotopes chemically bonded to proppants. NLC seeks information on the proposed application of such technologies in the Northern Territory.

The risk of an event occurring is best assessed with respect to likelihood, mitigation, and impact. To enable productive dialogue on the risks and impacts of petroleum extraction or production beyond prescribed boundaries, NLC seeks further clarification on the means by which NT government propose to monitor and regulate drilling and induced fracturing, including:

- i) how project operators are required to report to government the spatial profiles and extent of well holes and induced fractures,

- ii) how these profiles and extents will be mapped and spatial information preserved over time, and
- iii) how government proposes to actively regulate the compliance of operators

The NLC also recommends that information on the spatial profiles and extent of well holes and induced fractures be available to Land Councils.

Reference list

CSIRO (2012) "Australia's Shale Gas Resources" (CESREfs017-12)

Economides, M. J. and Martin, T. (2007) "Modern Fracturing, Enhancing Natural Gas Production"

Hicks, B. 2012 "Multi Well Pad Will Sink OPEC" <http://www.energyandcapital.com/articles/multi-well-pad/2892> (cited 28/8/2014).

US Department of Energy, Office of Fossil Energy, Washington, 10 February 2012
<http://www.energy.gov/fe/articles/remote-gas-well-monitoring-technology-applied-marcellus-shale>

US Department of Energy, Office of Fossil Energy, Washington, 28 November 2012
<http://www.energy.gov/fe/articles/research-projects-addressing-technical-challenges>