1 November 2013

Ministry for the Environment

PEPANZ Comments on Draft Hydraulic Fracturing Guidelines for Local Government

Introduction

This document constitutes the Petroleum Exploration and Production Association of New Zealand's (PEPANZ) submission in respect of the draft document *Managing Environmental Effects of Petroleum Development Activities (including Hydraulic Fracturing): Guidelines for Local Government* ("Guidelines"), released by the Ministry for the Environment in October 2013.

PEPANZ represents private sector companies holding petroleum exploration and mining permits, service companies and individuals working in the industry. PEPANZ members account for more than 95% of New Zealand's hydrocarbon production.

This submission is in two parts:

- Part 1 – Overarching comments
- Part 2 – Specific comments

Part 1 – Overarching comments

We have the two following overarching concerns with the draft Guidelines as they currently sit:

- The scope is unclear and the purpose of the Guidelines is not currently achieved
- Regulatory responsibilities regarding "well integrity" are not clarified.

Despite these comments we recognise the document provides much useful information about hydraulic fracturing ("HF") and related activities associated with upstream petroleum exploration and development.

Scope unclear and purpose of the Guidelines not currently achieved

We recognise that the genesis of the Guidelines was a desire to provide regulatory guidance around managing HF operations, particularly to regions where upstream petroleum activities were infrequent. However, in seeking to do this further information has been introduced regarding various upstream petroleum activities (particularly those most related to HF such as well drilling and construction).

As a result it has become unclear as to what the guidelines are intended to achieve. For example whilst the title page indicates they are concerned with managing the environmental effects of (all) petroleum development activities, the opening sentence of the purpose statement (page 5) indicates that they are (only) concerned with the management of HF. To add to the confusion, the opening two bullets under the heading "Scope" (section 1.2) indicate that the guidelines cover the whole lifecycle of oil and gas well development, not just HF, and other comments indicate that they cover the oil and gas industry more generally.

It is apparent from the body of the guidelines that whilst their focus remains on the regulation of HF and "related" activities, they also comment and provide advice on various activities not directly related to HF. The Guidelines do not however provide comprehensive advice on all wellsite activities let alone all aspects of the upstream oil and gas industry and so should not purport to do so.

Assuming that intent is indeed to focus on the regulation of hydraulic fracturing [reflecting concerns raised in the Parliamentary Commissioner for the Environment (PCE's) interim report on HF], and in the interests of timeliness avoiding a major revision of the document (to exclude all matters not related to hydraulic fracturing), we would suggest that the title of the document be amended to something like: "Managing the Environmental Effects of Hydraulic Fracturing and Associated Activities: Guidelines for Local Government". The reference to "associated activities" would enable related issues to be addressed where it is logical to do so (e.g. waste disposal). Other activities not directly or indirectly related to HF could either be left where they usefully provide context or removed from the Guidelines where they are sufficiently distant to tighten and focus the document. Adoption of this approach would necessitate some significant changes to Section 1 of the document and relatively minor adjustments to other sections.

If instead the scope is intended to cover the management of environmental effects of all petroleum exploration and development activities then there is a need to include a lot more information to expand some of the current sections and address issues such as site selection, pipelines, production facilities, reinjection wells that are little covered. This would require a lot more work and a much expanded document. We are not advocating this is pursued at this time.

An area where the scope of the Guidelines could be tightened in is regard to coal seam gas operations. Coal seam gas operations are mentioned in a number of places in the draft Guidelines (e.g. pages 9, 21, 38 and 46). Coal seam gas activities are however fundamentally different from petroleum drilling (whether conventional or unconventional) and whilst HF is generally involved it is different in nature and often undertaken much shallower. Coal seam gas operations also involve issues not relevant to petroleum operations such as the dewatering of coal seams that would need to be carefully handled under the *Resource Management Act 1991* ("RMA"). Further, whilst a coal seam gas well has some similar elements to a petroleum well, there are substantial differences in well design and so the general commentary provided in the guidelines currently around well issues would not be applicable.

The scope of the guidelines should be clarified to exclude coal seam gas operations as the guidelines do not cover some of these important issues specific to coal seam gas activities and so shouldn't purport to do so. One option would be to acknowledge the potential for CSG in at some point in the future in section 1.2 and then not refer to it further in the draft Guidelines. We note that given the distribution of known coal resources in New Zealand, coal seam gas operations are only likely to be an issue for a small number of councils, most of which already have some experience with coal seam gas activity.

Regulatory responsibilities regarding "well integrity" not clarified

The draft Guidelines do not in one key area currently achieve the stated purpose of providing clarity on the roles of central and local movement in the management of hydraulic fracturing ("HF"). The area where they fail to do this is in relation to the regulation of "well integrity" (discussed primarily in sections 3.7.3 and 5.2). As described currently there would be regulatory duplication in relation to well integrity.

The following section of this submission outlines why councils should be able to rely, for the purposes of well integrity assurance, on the various obligations and processes applying under the *Health and Safety in Employment (Petroleum Exploration and Extraction) Regulations 2013* ("HSE (PEE) Regulations 2013"). We

note avoiding regulatory duplication in this area is a wider issue than HF operations and applies to all drilling and well operation activities onshore and offshore.

Establishing and maintaining "well integrity" is fundamental to petroleum well operations. This involves providing effective barriers for containment of well fluids and pressures throughout the well's lifecycle (pressures generated from the formation below or from the surface in the case of HF). Properly designed and constructed wells with good well integrity safeguard workers and communities, minimize risks of leaks and spills, protect groundwater and surface water, are safe to operate and minimise risks of long-term failure.

The new HSE (PEE) Regulations 2013 provide comprehensive regulation of well integrity over the lifecycle of a well. Specifically they provide obligations for a well to be "designed, constructed, commissioned, equipped, operated, maintained, modified, suspended, and abandoned so that — so far as is reasonably practicable, there can be no unplanned escape of fluids from the well; and risks to the health and safety of persons from the well or anything in it, or from strata to which the well is connected, are as low as is reasonably practicable."

These regulations cover the well lifecycle from the commencement of design to when it is finally abandoned and include independent examination of the well design and operations. If this leaves a gap with regard to managing well integrity then it is not apparent what it is. The fact that this occurs under a health and safety framework rather than an environmental one does not alter what is actually being managed. There is no identified distinction between well integrity assurances provided for health and safety purposes and those provided for environmental protection purposes.

Because of this we fundamentally disagree with the view set out in the Guidelines that there is a role for councils in well integrity issues. This is expressed in various places throughout the document for example on page 35 as "Well integrity can be managed under the RMA through rules in regional and district plans, or through resource consent conditions in order to address potential impacts on the environment of a well failure ". The RMA is concerned with effects and controls should not duplicate those already provided under other regulations.

We consider that, in the interests of effectiveness and efficiency, both regional/district councils (and the EPA offshore) should be able to rely, for the purposes of well integrity assurance, on the various obligations, processes applying under the HSE (PEE) Regulations. Regulatory duplication in relation to well integrity (HSE Regs and RMA) is potentially inefficient and costly (e.g. could be hundreds of thousands of dollars per well for a council to commission independent specialist peer review) whilst not having any obvious benefits in terms of health and safety or the environment. Given the regulatory changes being progressed recently (new health and safety law, RMA changes etc) now is the time to resolve any uncertainty in responsibilities between regulators.

There are issues associated with the drilling and construction of a well that may require consideration under the RMA, such as any potential discharge of drilling muds in shallow water bearing zones during the initial drilling of a well (before it is cased). These are not however related to well integrity and because they are not considered under the HSE (PEE) Regulations there would be no regulatory duplication.

A relevant example of where regulatory duplication is avoided is some activities managed under the *Health and Safety in Employment (Pressure Equipment, Cranes, and Passenger Ropeways) Regulations 1999* ("HSE (PECPR) regs"). There is potential for environmental effects from a pressure vessel failure but certification or

approval of pressure vessels under the RMA is not specifically required as it already provided for under these other regulations. A pressure vessel failure could lead to enforcement under the RMA (as can damaging and unplanned discharges from other activities such as factories etc.) but the design etc. of pressure vessels (and factories) is not regulated under the RMA directly.

A summary table in the document outlining the various regulatory responsibilities relating to well drilling and operations could assist in providing clarity on the roles of central and local movement in the management of hydraulic fracturing ("HF"). The following table gives an indication of how this might look. The table does not attempt to cover operations on the well site beyond the well itself. Should the Ministry seek to include such a table we would be happy to provide further information to support this.

Activity	**RMA**	**HSE (PEE) Regs 2013**
Design of the well (including engineering and subsurface analysis)	No	Yes
Drilling of the well bore using a drilling rig	No	Yes
Potential for discharge of contaminants to water (drilling fluids in shallow water bearing zones)	Yes	No
Construction of the well (setting of casing and cementing etc)	No	Yes
Well completion operations (installation of production tubing, perforating etc)	No	Yes
The potential for discharge of HF fluids into land as planned part of HF operations	Yes	No
Wireline/slickline operations on the well	No	Yes
Workover operations on the well	No	Yes
Maintenance of pressure control equipment over the life of the well (BOPs, Christmas Trees etc)	No	Yes
Assurance of well integrity over life of the well	No	Yes
Abandonment of the well at end of life (plugging etc)	No	Yes

Part 2 - Specific comments on the draft Guidelines

This section contains specific comments on the content and guidance provided in the draft Guidelines. We have focussed our comments on the Guidelines rather than Appendices but note that should our comments be adopted some consequential changes to the Appendices may be required.

	PEPANZ Comments
Page 8	Suggest a map showing relevant onshore petroleum basins to potential HF activities would be more appropriate and relevant. The current Figure 1 is dominate by offshore basins which are not relevant to HF and the RMA.
Page 9	Suggest the Guidelines more clearly emphasize here that they are <u>not</u> focussed on coal seam gas activities.
	The "measurement of in situ rock stress for design of underground structures" could be added at the end of the final paragraph.
Page 10	Figure 2 should be updated to separately include the Worksafe NZ organisation as by the time the Guidelines are issued the new organisation will either be in place or about to be so.
Page 11	Suggest a reference to section 3.7.3 is included here as more information on the HSE (PEE) Regulations is provided there. The Health and Safety in Employment Act 1992 (and probably the new health and safety law) should be mentioned here also for completeness.
Page 13	The commentary around activity classes under the *Exclusive Economic Zone and Continental Shelf (Environmental Effects) Act 2012* is unnecessary and irrelevant as these are RMA guidelines. The section should be removed to streamline and focus the document. On this basis page 162 discussing this Act in the Appendix should also be removed.
Page 15	In relation to the comment that "little or no engagement occurs between permit holders and councils between completion of the Block Offer process and the lodgement of relevant resource consents". Whilst this might have been the case in some situations, particularly in the past, we don't consider this holds as a generic comment to be applied to all current operators.
	Saying the "lead time provided by the <u>Block Offer programme</u> potentially provides…" is confusing. It is not the Block Offer programme itself that provides this lead time but the normal conditions of the permit awarded to an operator as a consequence of the Block Offer process where this time period exists. The 3 bullet points towards the bottom of this page should acknowledge that operators engage landowners and any other heavily affected parties to help select a well site to minimise effects.
Page 16	As outlined above in Part 1 of the submission the statement beginning "Territorial or regional authorities need to be satisfied..." should be reworked to make clear that Territorial or

	regional authorities can rely on the HSE (PEE) Regulations 2013 to ensure well integrity will be sufficient to reduce the relevant environmental risks (e.g. blowouts, subsurface leaks etc) to an acceptable level.
	The Paragraph beginning "There is no requirement for integration…." should be reworked to provide clearer guidance on the responsibilities of different regulators. As outlined above in Part 1 of this submission a table of responsibilities could be useful.
Page 17	Section 3.7.4 should be completely removed from the document as marine seismic surveying (like offshore drilling activity) is not relevant to the scope of this document. To dedicate space to it in the document is therefore unnecessary and confusing. Onshore seismic surveying is part of the process leading to drilling and potentially HF but we consider in the interests of streamlining the document that the effects associated with it are either not discussed specifically, or further content is added so they are more fully covered. If there is a desire to retain section 3.7.4 then at a minimum it should be headed "seismic surveying in the marine environment" to avoid confusion and distinguish it from example section 4.1.2 "seismic survey assessment", which implicitly discusses onshore surveying.
	If the regulatory responsibilities regarding well integrity are clarified as we have proposed in Part 1 of this submission then the second paragraph on page 17 would logically be substantially reworked or removed.
Page 18	The 2nd bullet should also refer to casing.
Page 20	"Passive seismic" is an emerging technology and cannot be considered an alternative to conventional seismic surveys at this time. This reference could be omitted as seismic surveying is only peripheral in any case.
	Deviated drilling is becoming increasingly common so not logical to say "Most conventional wells are drilled vertically". Deviated doesn't mean horizontal, the deviations can be modest in comparison to vertical.
Page 21	Deviated drilling may also occur as a way to reduce the total number of well sites, reduce surface infrastructure or optimise the way the reservoir is produced, not just to avoid sensitive sites. This should be reflected in the text.
	The second paragraph of section 4.2.1 implies that a cement bond log is run after every cement job. This is not the case and it depends on both the objectives of the cement job and the quality of the execution.
	With regard to the fifth paragraph of section 4.2.1 - intermediate casing is not always cemented back into the previous casing. This depends again on the design and objectives of the cement job. Please see related comment on Figure 4 as well.
	Footnote 16 at the bottom of the page is incorrect, a "leakoff test" is designed to test the

	formation, not the casing of the well.
Page 22	Figure 4 gives the impression that wells are cemented over the full length. This is not necessarily or commonly the case. Cementing is designed to provide a number of things, including isolation and structural strength. This may or may not require the cement to go back to the previous casing shoe. Being related to well integrity this is addressed under the HSE (PEE) Regulations 2013 in any case.
Page 23	More commentary on the content of drilling muds would be useful rather than just saying they may include BTEX. We are not aware of oil based muds having been used in recent years in Taranaki. Synthetic muds should be discussed separately from oil based muds as they are used currently.
Page 24	Section 4.2.3 omits discussion of logging while drilling, which should be included for completeness. This has become a lot more common in recent years and in many cases has replaced wireline logs.
Page 25	The draft Guidelines talk about logs allowing the operator to confirm that the construction of the well meets specification. Logs are only one of the tools used to confirm well integrity and are not always used. The quality of well construction is something that is covered by the HSE (PEE) Regulations 2013 in any case and so would not need to be separately considered under other regulation.
Page 25	The processes described here for well completion, are often, but not always the case. It might be better to refer to "usually". Also there should be reference to testing here as this could occur substantially in advance of production depending on the way a field is developed. Well testing can take place before and/or after HF depending on the situation and can take place at different points during the life of a production well If an exploration well finds hydrocarbons it will likely be tested, but whether it will be produced will depend on the results of the testing and what this in turn means for the commerciality of developing the field considering. There are for example a number of hydrocarbon accumulations around New Zealand that have been discovered and tested but have not been produced from.
Page 25	We note packers are generally used where hydraulic fracturing is planned but aren't used in all well completions so the text should be reworked to reflect this.
Page 25	We note perforating is not always involved as there are alternate completion designs like shifting sleeves, toe ports etc. These various approaches should also be described for completeness.
Page 26	The reference to "300^{o}C or more" is misleading. One Taranaki field for example is around 105^{o}C at reservoir and the fracking fluids are pumped at ambient temperature (e.g. 15^{o}C).
Page 26	In relation to the 2nd bullet point (pre-pad volume) – acid is optional, not currently used by

	some operators.
Page 27	With regard to the first paragraph – pressure at surface does not need to increase throughout the job; highest pressure at surface is on formation breakdown and at the end of the job when the fluid is lighter and hydrostatic head is reduced, or when screening out.
	The fracture length and height listed are probably the max theoretically achievable so not necessarily "typical".
	"Leak off" reference is incorrect, should read "flow back".
Page 28	Figure 6 – It is not ideal to show the example of a North American based horizontal shale well as this is not very applicable to New Zealand experience to this point, where most wells subject to HF have been vertical in nature (albeit often with some deviation). An example of horizontal fractures from a vertical well would be more relevant to the New Zealand situation.
Page 29	Commentary on BTEX could be made clearer and more useful. BTEX is not a compound in its own right but a group of harmful substances that could be listed individually. This section should also refer to synthetic muds as well as water and oil-based muds. We note also that historical use of oil based muds is also not very relevant to forward these looking Guidelines.
Page 31	Section 4.5 should be renamed something like "Initial production". The production life of a well can be many years and over that time various regular activities are likely to occur such as well workovers (which are regulated under the HSE (PEE) Regulations 2013). In the interests of keeping the Guidelines relatively simple we suggest these are not discussed but the focus be on the initial production phase. By the time petroleum production is a mature activity in a new region the relevant councils will have had time to become familiar with the industry and so this does not need to be a focus of the Guidelines.
	The reference to "the reminder of the site can be reclaimed" is perhaps an overstatement. Suggest reference to Christmas trees as in future production sites are likely to have multiple wells.
	There is a "not" in the middle of the page after "hydrocarbons" that needs to be removed for the sentence to make sense.
	It is not clear who is doing the monitoring referred to at the bottom of this page.
Page 33 - 35	We consider the concept of "best practice" is confusingly used in section 5.2. We note the Guidelines uses four similar but different concepts (best practice, best practicable option, ALARP and good oilfield practice) and this is inherently complicated and confusing. Given that there will be many variables for each (drilling or HF) situation defining a single best practice in an area is unlikely to be a helpful approach. "Best practicable option" is a useful concept which is explicitly provided for under the RMA and also links better to the concept of ALARP, which is provided for under the HSE (PEE) Regulations. The term "good oilfield

	practice" is also logically used in the document. Avoiding the use of "best practice" as well would make things simpler.
Page 34	In relation to the 4th paragraph of Section 5.2.2: It is not always expected to get two casing strings across all fresh water zones.
Page 34 -35	As outlined previously in part 1 and in relation to section 3.7.3 we disagree with the statements about the role of councils in considering "well integrity". We do consider there is a role for councils in relation to the potential environment effects of actually drilling and initially constructing the well (e.g. use of synthetic based muds in shallow sections of the well) but these are not issues of well integrity as the well is only in the early stages of construction at this point and for example the casing has yet to be installed.
Page 35	All three of the three bullet points at the top of the page are explicitly covered by the requirements of the *HSE (PEE) Regulations 2013*. As such any coverage of these in "consent conditions or plan criteria" would represent duplication and for reasons outlined in Part 1 above we consider this should not occur.
Page 35	We note the case study provided in the bottom of page 35 took place under the now superseded *HSE (PEE) Regulations 1999*. Some of the elements where the case study suggests the council needs to be satisfied are explicitly covered under the *HSE (PEE) Regulations 2013* and so do not need to be covered again under a consent. Specifically the 1st and 3rd bullet points. The other four bullet points (2, 4, 5 and 6) are logically controlled under the RMA. We note the 2nd bullet at the bottom of the page implies there would always be groundwater monitoring. Logically the approach to monitoring should be based on the specific circumstances of the case and the risks of groundwater contamination, particularly given that the monitoring is put in place to pick up unlikely events.
Page 36	With regard to Case Study 1. As discussed previously the resource consent discussed here (when the previous HSE (PEE) Regulations 1999 were in force) contains elements that are now regulated comprehensively under the HSE (PEE) Regulations 2013. Specifically in regard to the bullet point beginning "well design and integrity" and "management of a risk of a well blowout", these are explicitly controlled under the HSE (PEE) Regulations 2013 and duplication under the RMA is not required.
Page 37	Well abandonment is already covered by the *HSE (PEE) Regulations 2013* and accordingly there is no need for specific RMA consent conditions with regard to well abandonment itself. It is appropriate for there to be RMA consent conditions relating to the decommissioning of a well site as this is not managed under the *HSE (PEE) Regulations* to any extent. The document should make it clearer that in relation to well abandonment the issues are with the well itself not really the HF activities (which might have taken place many years before).
	Are bond conditions appropriate to deal with well integrity after abandonment / decommissioning?

	Under the "Abandonment" heading – terminology here is a little confusing. Generally industry would talk about 'abandonment' of a well (i.e. downhole) and 'decommissioning' of the site as a whole. Suggest this section is retitled something like "Site decommissioning and well abandonment" rather than the current "Abandonment" as the issues are about the site not just the well/wells. It would be useful in the Guidelines to outline which aspects of well site abandonment (as opposed to well abandonment) should be managed by regional councils and which by district/city councils.
Page 39	Water is stored on site for water based drilling muds and other activities but not typically for fire fighting as you can't fight an oil fire with water.
Page 40	The bullet points at the end seem to be indicating that limits should be placed on the rate at which water should be used (e.g. rate of injection, etc) within the HF process. The required rate is however determined by technical requirements which may be difficult to predict at resource consent application stage. It would be more appropriate to talk about limits on amount/rate of water that can be taken from the water supply. Also note that at some well sites in Taranaki where water is taken from the municipal supply there are large storage tanks on site, so that water can be taken from the supply when demand from other users (e.g. dairy sheds) is lowest.
Page 41	Examples of water usage in Case Study 2 from Taranaki and the United States provide some context but are basically random data points and don't provide any real guidance as to dealing with future situations. This should be acknowledged more clearly in the document. Case study 2 also discusses the trucking of water. We note water is also sometimes piped to sites in Taranaki to amongst other things reduce truck movements.
Page 45 and 46	Commentary around produced water is confusing and needs refinement and more context. Produced water is associated with testing and primarily with production but not with drilling, only comes when you produce. Comment that produced water can compromise 98 percent of the fluids from a well would be an unlikely situation. We assume this should be referring to the HF flow-back phase when a combination of produced water and frac flow-back could account for 98 percent of the fluids rather than just produced water as such.
Page 46	It is an exaggeration to say "radioactive tracers are commonly used" in Taranaki at the moment, they are only used in some situations but some operators.
Page 47	The 1st bullet point states that "Hydrocarbons are separated and flared on-site, as described in section 5.6". This is not entirely accurate. Gas will be flared if there is no pipeline connection (for example an exploration site) but hydrocarbon liquids (condensate and oil) will not be flared. They are separated from the liquids and generally stored at site before being removed by truck or pipeline depending on the circumstances. The 5th bullet point on is accurate but potentially misleading – as it is only relevant where radioactive tracers are used, which is not often.

Page 47 and 48	Section 5.5.2 appears to be focussed on the management of "waste solids, liquids and gas from the flow-back of fracture fluids (refer first sentence of this section) but then in the sub-section "Effects on groundwater" there is a discussion of drilling muds. This is confusing as the document does not link these discussions clearly.
Page 48	We note it is proposed groundwater bores are installed prior to activity commencing for baseline testing. As noted above the approach to monitoring should be based on the specific circumstances of the case and the risks of groundwater contamination.
Page 53	Section 5.6 would more sensibly be named simply "Discharges to air". Flaring is one of the activities that could cause discharges to air but is not the only one and it is the discharges that are the effect to be considered rather than the source.
Page 54	The top sentences should be more clearly linked to the *Crown Minerals Act 1991* regime (specifically the *Crown Minerals (Petroleum) Regulations 1997*) to avoid confusion around what the MBIE chief executive is approving.
	It is not very clear what type of disposal sites are being referred to in the section on air quality. Are these flares (combustion emissions) or land disposal sites (evaporative emissions) or both. Suggest this section is rewritten to make this clearer. The reference to dust emissions from roads just confuses things further.
Page 55	We note the study on effects associated with flaring undertaken by the TRC addressed a specific circumstance where entrained HF liquids were also directed to the flare system. In most circumstances, liquid separation would be undertaken prior to flaring or similar.
	If studies show the National Air Quality Standard is met at 140 metres and air quality often good at 70 metres then as noted in the Guidelines a 300 metre buffer zone provides a substantial health and safety buffer. It is not apparent however how this guidance would assist a council should there be a potential distance of less than 300 metres involved.
Page 57	Figure 9 heading - Fracture fluids themselves don't burn (only when entrained with hydrocarbons) so suggest the heading is adjusted.
Page 58	We note there is no mention of traffic associated with trucking of water to a wellsite or flow-back waste out. Trucking of water or wastewater can be a significant (although very short-term) source of heavy vehicle movements.
Page 63	The sentence above the heading for section 5.8.2 regarding seismic surveys should be removed as it does not provide any useful guidance to councils. These matters are covered by a specific DoC administered Code of Conduct in the case of marine seismic surveys but it is not necessary to cover this as it is not relevant to HF activities under the RMA.
	Discussion of managing the noise issues associated with drilling and HF should be more clearly divided. With reference to the last sentence in the first paragraph of section 5.8.2, we question whether there is any need to specifically manage noise or vibration from HF

	provided the activity occurs during the day (higher noise limits) as the activity is of very short duration (a matter of hours). Drilling operations on the other hand can last for weeks on a 24/7 basis and so the noise issues are quite different.
Page 69	The last sentence of the first paragraph in section 5.10.2 needs to be rewritten.
Page 70	We note it is proposed that micro-seismic monitoring is employed for all HF situations. We understand this can only be used in specific circumstances (i.e. when you have close well spacing) and thus is not practical in all situations. As such we would not expect this to be a standard consent condition.
Page 84	The paragraph about NZEC is factually inaccurate. The consents in question weren't in Gisborne District Council so this explanation doesn't belong in this case study. The consents were obtained by BTW Company not NZEC and they were for a surface water take associated with shot hole drilling in Hawkes Bay Regional Council. The past work was done by Westech, not NZEC.
Appendix B	We note that our proposed approach to regulating well integrity outline in Part 1 would likely require some adjustment to the content of this Appendix.