MINIMUM REQUIREMENTS FOR THE REGULATION OF ENVIRONMENTAL IMPACTS OF HYDRAULIC FRACTURING IN SOUTH AFRICA

A position statement

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Centre *for* Environmental Rights
Advancing Environmental Rights in South Africa

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Executive Summary

Minimum requirements for the regulation of environmental impacts of hydraulic fracturing in South Africa.

1. The inadequate regulation of mining, and negligible compliance monitoring and enforcement, has had and continues to have significant negative impacts on the environment in South Africa. Many of these impacts cannot be remedied, and will continue to impose heavy financial, health and environmental costs on society for the foreseeable future. In light of the potentially severe and pervasive effects associated with the nascent shale gas industry, in particular the fracking technique, it is particularly important that fracking is regulated by an appropriate and comprehensive regulatory regime that is implemented, monitored and enforced.

2. **The regulation of the environmental impacts of fracking must comply with the existing legal framework.** This includes:
   a. fundamental rights in the Constitution, including the right to an environment not harmful to health and wellbeing, the right to sufficient food and water, the right to just administrative action and the right to access to information;

   b. the National Environmental Management Act, 1998 (NEMA), particularly the environmental management principles, such as: the principle of sustainable development; decision-making in an open and transparent manner with access to information provided in accordance with the law; the precautionary principle; the polluter pays principle; the principle of cradle-to-grave responsibility; the public trust principle; and the prevention of unfair discrimination; and

   c. the National Water Act, 1998 (NWA), the National Environmental Management: Waste Act, 2009 (NEMWA) and the National Environmental Management: Air Quality Act, 2004 (AQA).

3. **The regulation of the environmental impacts of fracking in South Africa must comply with best international practice and best international regulatory requirements**. Approaches that must be considered cannot only be the industry standards published by the American Petroleum Institute (a US trade association working to ensure the viability of the US oil and natural gas industry), but at least those produced in the past two years by other authorities such as the International Energy Agency, the European Commission, the United States' Environmental Protection Agency and the United Kingdom's Department of Energy and Climate Change.

4. **The environmental impacts of fracking must be regulated under the appropriate legal framework, in an integrated and streamlined manner.** The proposed technical regulations for the petroleum exploration and exploitation published by the Minister of Mineral Resources on 15 October 2013, which

include proposed rules in respect of fracking (the "proposed fracking regulations"), attempt to regulate all environmental impacts of fracking through the Mineral and Petroleum Resources Development Act, 2002 (MPRDA), when there is a suite of water and environmental laws specifically designed to manage the environmental impacts of such an activity (see, for example, the section entitled "Management of Water" that makes no reference to the NWA, and the section entitled "Management of Waste" that makes no reference to NEMWA). While it is valuable to aggregate all regulatory provisions into a single set of regulations, those regulations must be appropriately authorised by the relevant statutes.

5. **The environmental impacts of fracking must be regulated by the appropriate competent authority or authorities in an integrated and cooperative manner, with appropriate resources**. Even if the 2013 proposals for amendment to the MPRDA are effected, the authorisation, compliance monitoring and enforcement of these activities will be undertaken primarily by the DMR and the DWA, both national departments with extremely limited resources (particularly absent is adequate numbers of staff with appropriate qualifications and experience) for compliance monitoring and enforcement.

6. **Key recommendations in this document include**:
   a. that regulations must be promulgated not only under the MPRDA, but also under NEMA, the NWA, the National Environmental Management: Waste, 2008 (NEMWA), the National Environmental Management: Air Quality Act, 2004 (NEMAQA), alternatively be delayed until the commencement of the environmental management of mining activity under NEMA expected in December 2014, if not before;

   b. promulgating regulations under the appropriate legislation would also ameliorate the problem of inadequate penalties for violations in the MPRDA as it stands: penalties in environmental legislation are far harsher than those in the MPRDA;

   c. that the environmental authorisation of fracking related activities and the compliance monitoring and enforcement of environmental provisions in relation to fracking are exercised by a specialised, inter-departmental unit under the Minister of Water and Environmental Affairs. The costs of recruiting, employing and training inspectors must be borne at least partly by licence holders;

   d. that an independent expert panel be appointed by the Minister of Water and Environmental Affairs to review and advise competent authorities on all environmental impact assessments for fracking (including financial provision), to ensure the integrity of assessments and consistency of requirements across the country;

e. that comprehensive provision be made in the regulations for:

   i. protection and promotion of disadvantaged and vulnerable communities, and for appropriate public consultation and engagement:

      (1) engaging with local communities, residents and other stakeholders prior to each development phase, with sufficient opportunity for comment and appropriate responses (these are not currently requirements under the MPRDA or the MPRDA Regulations);
      (2) involving the local community (with the appropriate training and motivation) in compliance monitoring by, for example, being tasked with the raising of alerts after becoming aware of areas for concern;

   ii. the completion of baseline measurements for key environmental indicators including: groundwater quality, supply and characteristics; surface water quality, supply and characteristics; seismic characteristics; air quality and emissions (including radioactivity and radio frequency levels); and noise quality;
   iii. public access to all licences issued for fracking, and all compliance reports against those licences;
   iv. adequate and reliable measurement, monitoring and disclosure of information on water use, volumes and characteristics of waste water and air emissions, and fracking fluid additives and volume, which must be displayed on a public disclosure register; [1]
   v. requirements for site selection must account for geological structures, water availability and accessibility, waste disposal options, cumulative and regional impacts; and must avoid or minimise impacts on local community, heritage, existing land use, individual livelihoods and ecology. Environmentally sensitive and significant areas must be excluded, and local zoning schemes respected.
   vi. approval of exploration and production rights in a phased and measured manner to allow for the cautious practical assessment of economic, technological and environmental indicators, and limitations on actual fracking during the exploration phase;
   vii. obligations to reduce the use of freshwater for fracking, coupled with a prohibition on the use of potable water in fracking;
   viii. responsible and lawful water use, storage, treatment and disposal, coupled with the use of "green completions" for the separation of flowback water from natural gas that would also eliminate venting and flaring of natural gas;
   ix. minimisation of the use of chemical additives, and promote innovative less harmful alternatives;
   x. ensuring integrity of well design and construction that complies with best international practice and best international regulatory requirements;
   xi. an early warning monitoring and response system for failures, blowouts, spills and contamination;
   xii. appropriate and significant financial provision for rehabilitation, that – unlike the DMR's current guidelines – actually take into account the effects of inflation on the calculation of such provision over time;

f. that strict enforcement and penalties are applied in the event of non-compliance. Over and above the usual remedies such as suspension or revocation of licences, licences should provide for

significant administrative penalties in the case of violations of licence conditions and/or legislative provisions, up to a maximum of the higher of R20 million or 10% of turnover or 10% of gross asset value, whichever is the highest.

7. **To the extent that any proposed fracking regulations aimed at governing environmental impacts of fracking do not comply with the minimum requirements set out in this document, we regard these as inadequate and flawed**. In particular, they *inter alia*:

   a. read as a guideline for norms and standards instead of regulatory requirements with binding obligations and, as such, make no provision for the creation of offences and penalties for violations of these guidelines;

   b. instead of drawing on a wide range of best international practice and best international regulatory requirements, rely solely on industry standards published by the American Petroleum Institute (API), a US trade association for the oil and natural gas industry; [2]

   c. do not provide for the public participation of stakeholders, despite the potentially significant and pervasive detrimental effects associated with fracking, and despite the amorphous and inadequate provisions for public participation provided by the MPRDA and the MPRDA regulations;

   d. do not provide for public access to environmental information, licences and compliance and performance data against acceptable standards, despite the necessity of public access to clear, comprehensive and accessible information from an unbiased source to enable meaningful public participation; and

   e. purport to regulate all impacts of fracking, including the environmental impacts, under the MPRDA notwithstanding the fact that:

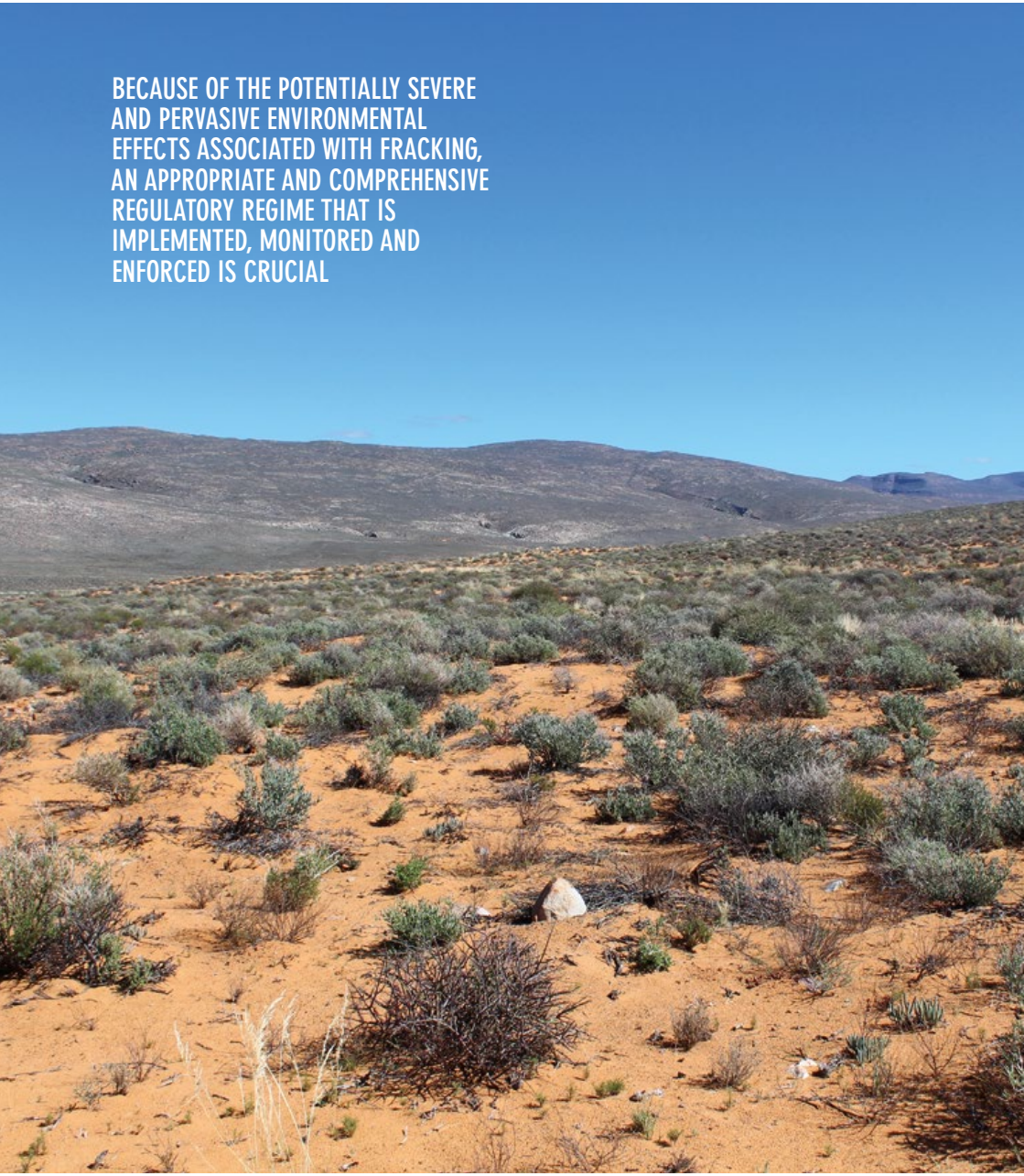
      i. the environmental management of mining activity under the MPRDA is soon to be transferred to NEMA;
      ii. the MPRDA regime is ill-suited to the environmental management of fracking related activity and fails to provide for the effective mitigation of the high risks of cumulative impacts; and
      iii. there is a whole suite of water and environmental legislation designed to regulate the environmental impacts of all activities that impact on the environment, including fracking.

ENDNOTES

1 An example of this is the US based website, FracFocus, available at www.fracfocus.org.

2 According to the API's website (www.api.org), it is "the only national trade association that represents all aspects of America's oil and natural gas industry. Our more than 500 corporate members, from the largest major oil company to the smallest of independents, come from all segments of the industry. They are producers, refiners, suppliers, pipeline operators and marine transporters, as well as service and supply companies that support all segments of the industry." API's mission is "to influence public policy in support of a strong, viable US oil and natural gas industry essential to meet the energy needs of consumers in an efficient, environmentally responsible manner."

BECAUSE OF THE POTENTIALLY SEVERE AND PERVASIVE ENVIRONMENTAL EFFECTS ASSOCIATED WITH FRACKING, AN APPROPRIATE AND COMPREHENSIVE REGULATORY REGIME THAT IS IMPLEMENTED, MONITORED AND ENFORCED IS CRUCIAL



Introduction and Purpose

The use of hydraulic fracturing ("fracking") to explore for and exploit natural gas in South Africa has the potential to have significant impacts on the South African environment and its people, at least some of which may be significantly detrimental. **Unless fracking is well regulated, the detrimental impacts are likely to be severe and irreversible**.

Nonetheless, public statements by government representatives indicate that the Minister of Mineral Resources intends to grant exploration licences authorising the use of fracking to explore for shale gas in the Karoo in the near future.

The Minister of Mineral Resources published the **Proposed technical regulations for petroleum exploration and exploitation** on 15 October 2013 ("the proposed fracking regulations").[1] The Minister of Water and Environmental Affairs published the **Proposed declaration of the exploration for and production of onshore unconventional oil or gas resources or any activities related thereto including but not limited to hydraulic fracturing as a controlled activity** under the National Water Act, 1998, on 23 August 2013.[2] The Director General for the Department of Mineral Resources (DMR) has reportedly announced that the proposed fracking regulations are to be published shortly following the commentary deadline, and that exploration in the Karoo could start soon after this publication.[3] Consequently, other than the recommended future listing of hydraulic fracturing as an activity under the NEMA EIA Regulations' Listing Notices, it appears that:

1. the proposed fracking regulations and the proposed "controlled use" declaration are to comprise the only legislative requirements expressly geared toward fracking in place at the time of the Minister of Mineral Resources' decision regarding the award of exploration rights for shale gas in the Karoo (contrary to suggestions in the DMR's report following its Investigation of Hydraulic Fracturing in the Karoo Basin of South Africa [4]); and
2. the suspension of any prospecting rights awarded, pending the outcome of appeal and review processes, is unlikely.

Against this background, this document sets out the minimum legal requirements that we believe – and are advised by independent experts both in South Africa and abroad – should be incorporated into any regulatory framework to regulate fracking in South Africa in order to give effect to the environmental right in section 24 of the Constitution, and as developed in South African environmental law. **We have prepared this memorandum as a contribution to the process of developing appropriate and effective legal and governance systems to ensure that fracking does not infringe the fundamental right in section 24**. It is likely that this document may evolve as more information becomes available both locally and internationally around both best practice and poor practice.

This document should not be interpreted as indicating that the CER endorses the use of fracking. The CER's position in this regard is set out in our position statement on protection of environmental rights in decisions around fracking for shale gas available on our website: www.cer.org.za/news/position-statement-on-protection-of-environmental-rights-in-decisions-around-fracking-for-shale-gas.

The environmental impacts of conventional mining in South Africa have never been regulated effectively. To the extent that appropriate regulations do exist, the implementation of such regulations has been practically ineffective. As a result, mining has had and continues to have significant negative impacts on the environment. Many of these impacts, such as acid mine drainage, cannot be remedied and will continue to impose heavy financial, health and environmental costs on society for the foreseeable future. **Should the South African government decide to issue exploration and production rights for shale gas fracking, the least we expect is an appropriate regulatory regime that is implemented, monitored and enforced.**

For the purposes of this submission, "mining" should be read as including all prospecting, mining, reconnaissance, exploration and production activities regulated by the Mineral and Petroleum Resources Development Act, 2002 (MPRDA) with "mining related activities" read in a similar manner. Whilst the term "fracking" specifically refers to the act of hydraulic fracturing it should be understood in the broader sense as including all activities directly associated with this technique.

Minimum Requirements

Any regulatory framework for fracking should reflect the following principles and specific elements in order to protect the environmental rights of current and future generations adequately.

PRINCIPLE 1
Compliance with the Constitution

Any regulatory framework must accord with the Constitution of the Republic of South Africa, 1996, as South Africa's supreme law, and give effect to the rights enshrined in the Constitution's Bill of Rights.

Section 24 of the Constitution establishes the right to an environment that is not harmful to one's health and wellbeing and imposes a positive obligation on the state to protect the environment for both present and future generations "through reasonable legislative and other measures that — prevent pollution and ecological degradation; promote conservation; and secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development." This environmental right is specifically recognised in the objects of the MPRDA (s. 2(h)). As confirmed in the *Constitutional Court decision of Maccsand (Pty) Ltd v City of Cape Town and others*,[5] the MPRDA is one of the laws passed to promote section 24 of the Constitution with its purposes including the protection of "the environment by ensuring ecologically sustainable development of mineral and petroleum resources while at the same time promoting economic and social development."

This means that fracking must only be permitted to the extent that it can be undertaken in a manner that is consistent with section 24 of the Constitution, and that any regulation of fracking must constitute "reasonable legislative measures" that comply with the requirements of section 24(b) of the Constitution.

Other constitutional rights of particular relevance to the relationship between fracking and the environment include the right to property (section 25), the right of access to sufficient food and water (section 27(1)(b)), the right of access to information (section 32), and the right to just administrative action (section 33).

PRINCIPLE 2
Compliance with environmental management principles in NEMA

Any legislation governing fracking must give effect to the principles detailed in section 2 of NEMA which bind "the actions of all organs of state that may detrimentally affect the environment". These principles apply the constitutional rights in a practical environmental context, serve as the framework within which environmental management and implementation plans are to be formulated, and serve as guidelines for any state organ exercising any function concerning the protection of the environment (NEMA section 2(1)(b) and (c)). The NEMA principles therefore clearly apply to all regulation of and decisions regarding fracking operations.

Where these principles are not specifically detailed under this section, they are referred to in the context of the specific issues listed under section D below.

A. *Sustainable development*

Fracking should only be authorised if the proponent can demonstrate that it will contribute to sustainable development in South Africa. The national environmental management principles set out in section 2 of NEMA must be applied to determine whether or not an activity will have a positive or negative impact on social, environmental and economic sustainability. The NEMA principle relating to sustainable development[6] requires that:

2.1.1. the disturbance of ecosystems, loss of biological diversity, environmental pollution and degradation, waste and the disturbance landscapes and cultural heritage sites must be avoided (or, where these impacts cannot be altogether avoided, that they are minimised and remedied) (the "**preventive principle**");
2.1.2. the use and exploitation of non-renewable natural resources must be responsible and equitable taking into account the consequences of resource depletion;
2.1.3. the development, use and exploitation of renewable resources and the ecosystems of which they are part must not exceed the level beyond which their integrity is jeopardised;
2.1.4. a risk-averse and cautious approach must be applied which takes into account the limits of current knowledge about the consequences of decisions and actions (the "**precautionary principle**"); and
2.1.5. the negative impacts on the environment and on people's environmental rights must be anticipated and prevented (or, where these impacts cannot be prevented, they are minimised and remedied).

B. *Public participation and access to information*

Under section 33(1) of the Constitution, everyone has the right to administrative action that is lawful, reasonable and procedurally fair.[7] The NEMA principles require decision-making in an open and transparent manner with access to information provided in accordance with the law (NEMA section 2(4)(k)). This requirement applies the constitutional rights to access to information and just administrative action.

Section 32(1) of the Constitution provides that everyone has the right of access to (a) any information held by the state; and (b) any information that is held by another person and that is required for the exercise

or protection of any rights.[8] The public's access to information determines whether all stakeholders are able to participate in those decisions affecting them in any meaningful way and acts as a check on administrative actions.

Because of the many stakeholders likely to be fundamentally affected by fracking, combined with the novel techniques to be adopted, it is particularly important that all stakeholders are provided with complete relevant information to allow for informed and impartial decision-making.

C. *Preventive and precautionary principles*

As fracking is new to South Africa, whilst its social and environmental impacts are likely to be extensive, the risks are poorly understood. Applications have been made for exploration permits that would permit fracking in areas such as the Karoo where water is scarce, natural environments are relatively intact and solitude and a sense of place are highly valued. Some of the risks associated with fracking, such as the potential contamination of groundwater, will not be capable of remediation. Furthermore, there is a paucity of research data available on geohydrology and biodiversity in the Karoo: the ground and surface water reserves in the Karoo have not yet been established. In these circumstances both the preventative and precautionary principles must be applied strictly.

In this context, compliance with the preventive and precautionary principles means that, at the very least:

- fracking should not be permitted if it would create a risk of irreparable significant harm to the environment, water or other natural resources;
- regulatory measures must be designed to prevent, minimise and mitigate environmental harm; and

- any fracking that is permitted should be done on a phased basis to enable the authorities to learn about the impacts, including from the inevitable mistakes and progressively to improve the regulatory framework.

D. *Polluter pays*

Fracking indisputably poses a significant risk to the environment. Anyone whose activities cause or are likely to cause environmental damage must bear the full cost of preventive and restorative measures. This principle is enforced by NEMA section 2(4)(p) which provides that those responsible for harming the environment pay for the "costs of remedying pollution, environmental degradation and consequent adverse health effects and of preventing, controlling or minimising further pollution, environmental damage or adverse health effects." The amount of gas recovered from a fracking well declines rapidly. Fracking companies generate most income from freshly fracked wells and their revenues tend to boom when the rate at which new wells are fracked is accelerating, but then decline rapidly as that rate slows.

It follows that the regulatory framework must include effective measures:

- to impose liability on licence holders for fully remedying any environmental harm caused directly or indirectly by fracking, and
- to ensure that adequate, irrevocable and ring-fenced financial guarantees for the potential costs of doing so are in place before fracking is undertaken. See section 5.i below.

E. *Responsibility from "cradle to grave"*

This NEMA principle requires that state organs are responsible for "the environmental health and safety consequences of a policy, programme, project, product, process, service or activity throughout its life cycle" (NEMA s. 2(4)(e)). Consequently state organs must ensure that fracking is regulated from "cradle to grave". This concept is carried through into the mine closure provisions of the MPRDA Regulations, 2004, whereby the right holder is required to ensure that latent and possible residual environmental impacts, which remain after the issuing of a mine closure certificate, are identified and quantified and financial provision is secured (reg 56(d)).

This means that:

- before deciding whether or not to authorise fracking, competent authorities must consider all possible impacts during exploration and pre-construction, the operational, well closure, site and rehabilitation phases and beyond to the management of situations in which environmental impacts become manifest many years after well closure and ostensible rehabilitation;
- fracking companies must be responsible for all environmental impacts arising from any stage of the fracking life cycle (e.g. those arising from sand mining, trucking, road construction and maintenance, the disposal of flowback water and gas flaring); and
- the regulatory framework must include effective means of monitoring compliance of every aspect throughout the life cycle and provide for effective means of compelling compliance at any stage, including through securing adequate financial provision.

F. *Public trust*

NEMA confirms the constitutional principle that the environment is held in public trust for the people: the beneficial use of environmental resources must serve the public interest and the environment must be protected as the people's common heritage (NEMA s. 2(4)(o)). Likewise, the MPRDA recognises that "South Africa's mineral and petroleum resources belong to the nation" with the state as custodian (MPRDA preamble and s. 2(b)). As such, the DMR is obliged to ensure that any allocation of mining rights (including those associated with fracking activity) is for the benefit of the general South African population (including the natural resources on which they rely).

G. *Prevention of unfair discrimination*

The NEMA principles further confirm that environmental management is to "place people and their needs at the forefront of its concern, and serve their physical, psychological, developmental, cultural and social interests equitably." (NEMA section 2(2)). This means that the environmental implications of fracking must be managed in a way that prioritises the public interest.

Fracking may not be undertaken so that its benefits or adverse environmental impacts are distributed so as to unfairly discriminate against any person, particularly the vulnerable and disadvantaged. The NEMA principles require the pursuit of environmental justice and uphold the equitable access to environmental resources, benefits and services (NEMA sections 2(4)(c) and 2(4)(d)).

This means that the regulatory framework must require the competent authorities to assess how the benefits and negative impacts of fracking are distributed across different social groups, and ensure that it does not result in environmental injustice and discrimination. This is particularly relevant to the Karoo, where many communities live in abject poverty.

H. *Holistic approach*

As recognised under the NEMA principles (sections 2(4)(b) and 2(4)(l) read with NEMA chapter 4), any environmental occurrence, by its very nature, cannot be viewed in isolation. An integrative approach is particularly necessary in a large-scale project concerning natural resources that uses techniques with unknown and potentially pervasive effects such as fracking. It is vital that the regulation of fracking is undertaken with an holistic approach that looks at environmental integrity on an ecosystem basis and extends to the ancillary and incidental impacts associated with fracking activity.

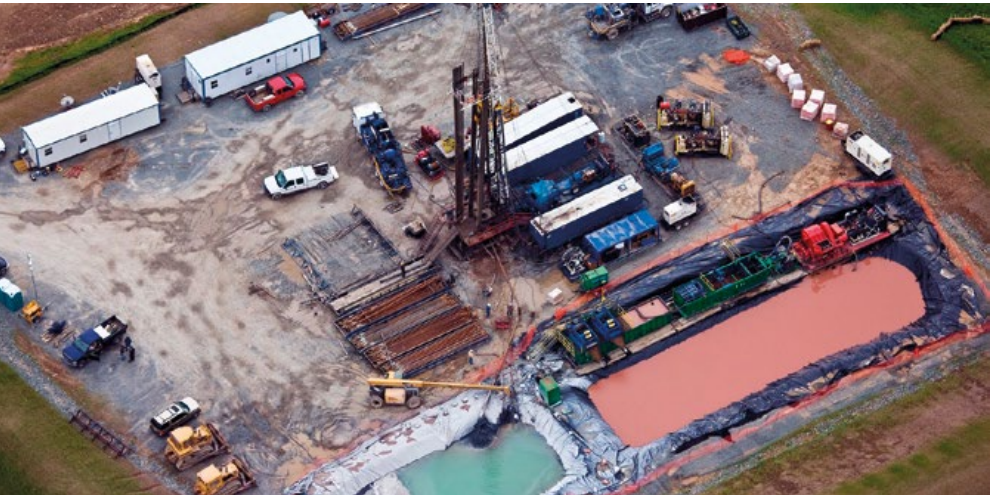
This means that the environmental impact assessment of fracking must include a consideration of issues such as the cumulative impact of all fracking in an area on roads, traffic, local communities, biodiversity and their long-term sustainability.

PRINCIPLE 3
Compliance with international best practice

As fracking has not yet been conducted in South Africa, the precautionary and preventive principles require that we look to international best practice as well as to the best practice undertaken in comparative domestic spheres. The proposed fracking regulations refer to the standards of the American Petroleum Industry (the "API Standards"). Whilst we commend the application of international practice, we note that the API Standards are intended to address problems of a general nature with local, state, and federal laws and regulations to address particular circumstances. Furthermore, the API standards cannot purport to be an impartial benchmark, as they are prepared by a national trade association comprised of petroleum industry representatives. The API's dedication to make "continuous efforts to improve the compatibility of their operations with the environment" falls short of ensuring the protection of environmental rights.[9]

It is imperative that there is also consideration of approaches such as those outlined in at least the following **key reports and guidelines by international agencies and regulators**:

- the **International Energy Agency's** 2012 report *Golden Rules for a Golden Age of Gas: World Energy Outlook Special Report on Unconventional Gas*;[10]
- the **European Commission**'s 2012 Report on Potential Risks from Fracking entitled *Support to the identification of potential risks for the environment and human health arising from hydrocarbons operations involving hydraulic fracturing in Europe*;[11]
- the current and developing standards of the **United States of America's federal Environmental Protection Agency** ("EPA") such as the April 2012 Oil and Natural Gas Air Pollution Standards;[12] and
- the **United Kingdom's Department of Energy and Climate Change**'s July 2013 *Guidance about shale gas and hydraulic fracturing (fracking)*.[13]



PRINCIPLE 4
Regulatory framework and competent authority

A. *Appropriate regulatory framework*

The environmental management of mining activity under NEMA and the MPRDA is in a state of flux. Currently the Minister of Mineral Resources is the authority responsible for granting environmental authorisations of mining activity (the "Competent Authority"). Following the commencement of the Mineral and Petroleum Resources Amendment Act 49 of 2008 (MPRDAA 2008), from 7 December 2014 the environmental management of mining will be governed by NEMA. The amendments proposed under the Mineral and Petroleum Resources Amendment Bill [B15-2013] (MPRDA Bill) and National Environmental Laws Amendment Bill [B26-2013] (NEMLAB 3) provide for the retention of the Minister of Mineral Resource as Competent Authority with the Minister of Water and Environmental Affairs as appeal authority.

The interim situation is confusing: not only does the MPRDA Bill refer to the MPRDA as if it were wholly amended by the MPRDAA 2008[14] but many of the "repealed" environmental management provisions of the MPRDA are now only "sustained" by section 11 of the Interpretation Act, 1957, due to the staggered commencement of environmental management under NEMA.

It appears that, by promulgating the proposed fracking regulations under the MPRDA, the DMR is intending to regulate the environmental effects of fracking even though the environmental management of mining activity under the MPRDA is soon to expire (and, indeed, would have expired absent the application of the Interpretation Act). This is concerning for many reasons, including that the underlying rationale for the transfer of the environmental management of mining activity to fall under NEMA is so that the environmental effects of all industries are managed consistently under the appropriate legislation. Moreover, the environmental regulation of fracking under the MPRDA (and any regulations issued under the MPRDA about environmental matters) may be defunct following the repeal of the MPRDA's environmental management provisions on 7 December 2014. In any event, the proposed fracking regulations do not appear to operate in any cohesive manner with the MPRDA Regulations, 2004.

Concerns even more fundamental in nature arise because the MPRDA in its current or proposed form does not appear suited to the regulation of the nascent natural gas industry: it is only in the definition of "petroleum" that the MPRDA makes any specific reference to natural gas.

While it is valuable to aggregate all regulatory provisions into a single set of regulations, those regulations must be appropriately authorised by statute. The current proposed regulations, published under the MPRDA, make hardly any reference to the other legislation that regulate environmental impacts of activities that would patently include fracking, most notably NEMA and the National Water Act, 1998 (NWA). Regulations must therefore be promulgated under MPRDA, NEMA, the NWA, the National Environmental Management: Waste, 2008 (NEMWA), the National Environmental Management: Air Quality Act, 2004 (NEMAQA), with express reference to the empowering provisions in each statute for the promulgation of regulations.

Alternatively, the promulgation of fracking specific regulations must be delayed until the commencement of the environmental management of mining activity under NEMA in December 2014 to allow for the smooth and comprehensive transition of this process, the integration of any outstanding aspects (for example, provisions in relation to the management of environmental rehabilitation funds under NEMA, and the appeal and coordinated licensing processes for environmental authorisations of mining activity) and the regulation of fracking under the appropriate statutory framework.

B. *Competent authority for authorisation, compliance monitoring and enforcement*

The CER, together with a number of other civil society organisations, submitted our concerns about the DMR's lack of capacity and incentive to implement NEMA to Parliament, and reiterate that the environmental authorities are more appropriately placed to consider, issue and ensure compliance with environmental authorisations for mining activities than the DMR.[15] The MPRD Bill's retention of the Minister of Mineral Resources as the authority competent to grant the environmental authorisation of fracking activities allows the DMR, with its mission to "promote and regulate the minerals and mining for transformation, growth, development and ensure that all South Africans derive sustainable benefit from the country's mineral wealth" [16], to control whether fracking activity is authorised under NEMA.

The DMR's inherent conflict between its obligations to promote mining and its proposed obligations as Competent Authority under NEMA is illustrated by the MPRD Bill's proposed designation of the regional manager as authority for functions relating to fracking[17] despite the administrative practice that the regional manager, as delegated authority, is tasked with the evaluation and often the approval of applications for environmental authorisations under the MPRDA.

On the one hand, fracking is a specialised activity that is new to South Africa. On the other, government has repeatedly committed itself to the more integrated regulation of the environmental impacts of mining activities. As such, we should take the opportunity:

1. to establish a specialised, inter-departmental unit, tasked with the consideration of environmental authorisations for fracking activity as well as the monitoring and enforcement of such environmental authorisations. The unit must function on both a national and provincial level (in line with the environment being an area of concurrent national and provincial competence under Schedule 4 to the Constitution); and

2. to use the provisions under section 24(l) of NEMA read with the Environmental Impact Assessment Regulations, 2010 (the "EIA regulations"), to appoint an independent expert panel to review and advise competent authorities on all scoping and environmental impact reports.

   So as to ensure the environmental impacts of fracking are adequately regulated in accordance with the Constitution, NEMA, the MPRDA, NEMWA, NEMAQA, the NWA and the Promotion of Administrative Justice Act, 2000, this specialised unit should comprise sufficient numbers of suitably qualified, experienced, incentivised and resourced and authorised officials:
   a. to administer, consider and make recommendations on applications for environmental authorisations for mining;

b. to monitor compliance with environmental authorisations, and with general obligations for responsible environmental management; and
c. to take both administrative and criminal enforcement action where violations are detected.[18]

The effective operation of any monitoring and enforcement agency is contingent on the creation of enforceable sanctions within the relevant legislative framework. The proposed fracking regulations are more akin to a guideline in that they create no enforceable obligations; because the proposed regulations would be promulgated under the MPRDA, available penalties are wholly insufficient to govern the potentially massive impacts of violations.

It is imperative that binding requirements, with appropriate severe sanctions for non-compliance, are promulgated before the Minister of Mineral Resources makes any decision regarding shale gas exploration (and production) so that those regulations can control the potentially pervasive impacts of fracking in any real and effective manner.

PRINCIPLE 5
Specific aspects of fracking

A. *Provide for appropriate public consultation and engagement*

i. **Engage with local communities, residents and other stakeholders prior to each development phase, with sufficient opportunity for comment and appropriate responses.** The proposed fracking regulations provide no opportunity for a transparent public participation process. The NEMA principles promote the participation of all interested and affected parties in environmental governance with all people given "the opportunity to develop the understanding, skills and capacity necessary for achieving equitable and effective participation" and with participation by vulnerable and disadvantaged people ensured (NEMA s. 2(4)(f)). Meaningful public participation is a pre-requisite to the realisation of NEMA principle section 2(4)(g) which requires decisions to account for "the interests, needs and values of all interested and affected parties". Meaningful public participation must account for the language barriers of South Africa's multilingual society and provide clear, comprehensive and accessible information (see section B (i) below).

Due to the potentially extreme and far-reaching detrimental impacts associated with fracking, it is important that all stakeholders have the opportunity to participate in each significant stage in the shale gas process including that relating to water use and well 'abandonment' and closure. Compliance with a defined stake holder management plan will ensure such participation. In contrast with the EIA Regulations, the MPRDA Regulations make very limited provision for public participation. Accordingly, absent the recommended inclusion of fracking as a listed activity under NEMA, the proposed fracking regulations must include specific and detailed provision for transparent, informed and meaningful public participation.

B. *Provide for baseline measurement, disclosure and access to information*

i. **Promote public access to information**. The public's access to clear, comprehensive and accessible information from an unbiased source is vital to ensure that public participation is meaningful, and any consent (or lack thereof) is informed. The information to be disclosed must include that listed at b.iii to vii below. This information should be displayed on a public disclosure register along the lines of the US based website, FracFocus (http://fracfocus.org) which is the product of nationally recognised organisations working with state governments and industry stakeholders to provide public transparency.

ii. **Inform stakeholders**. Relevant information must be made available to stakeholders prior to each significant stage in the fracking process. For example, it is vital that stakeholders are informed (with sufficient) notice prior to the commencement of fracking operations so as to ensure that they are able to take any necessary measures.

iii. **Establish baselines for and disclose key environmental indicators** including: groundwater quality, supply and characteristics; surface water quality, supply and characteristics; seismic characteristics;

air quality and emissions (including radioactivity and radio frequency levels); and noise quality. These baselines need to be collated over a two to five year period in advance of new drilling activity to ensure accuracy and must account for seasonal variations. Such measurements are essential for the meaningful tracking of environmental performance and compliance with environmental standards. The collation of this information should be shared amongst the regulatory authorities, industry and other stakeholders so to share costs and promote independence. The Flow 2 earth stewardship programme has been established by the Nelson Mandela Metropolitan University and AON South Africa, in collaboration inter alia with the Department of Water Affairs, local farmers and municipalities to collate baseline data and provide ongoing monitoring of water levels and quality in the Eastern Cape. Baseline measurements are in line with the approach recently adopted by Illinois State which requires pre- and post-fracking water testing.

An essential component of this process is the provision of clear environmental standards and thresholds against which outcomes are to be measured. These measures cannot be variable subject to the "agreement" between the applicant of the respective rights and the authorities.

iv. **Approve exploration and production rights in a phased and measured manner**. This allows for the cautious practical assessment of economic, technological and environmental indicators on a 'test case' basis prior to more widespread licensing. Application of the preventive and precautionary principles requires such a measured approach be taken in the face of the new and unknown implications of fracking on the South African environment.

v. **Measure and disclose operational data on water use, volumes and characteristics of waste water and air emissions, and fracking fluid additives and volumes**. Whilst the proposed fracking regulations provide for disclosure only in limited circumstances to the designated agency (for example the results of a "baseline water quality assessment" (conducted over an unspecified time period) are to be submitted to the designated agency) transparency is essential for effective and impartial monitoring and enforcement and to instill public confidence. Companies are often reluctant to disclose the identity and types of chemicals used in fracking fluid for commercial reasons. These commercial concerns are outweighed by the risk of the violation of fundamental constitutional rights presented by the application of such chemicals. In the United States of America there is a move toward state-level regulations requiring wide public disclosure of the types and volumes of chemicals used, over and above the federal requirements that operators disclose certain hazardous substances, including fracking fluid, to officials and those responsible for emergency services.

In the USA, companies can publicly disclose the chemical additives in their fracking fluid for each well on the FracFocus website. Whilst this disclosure is generally on a voluntary basis, proposed regulations for Michigan State require the disclosure of chemicals on FracFocus – where chemicals are trade secrets, chemical families must be disclosed. In Colorado, companies must maintain a chemical inventory of all chemical substances used in well drilling – if a chemical is a trade secret, the name and not the composition must be disclosed (although the protected information must be provided to the government on request, or to a health professional following a confidentiality agreement). Illinois State also requires chemical disclosures both pre- and post-fracking.

The Canadian Association of Petroleum Producers' best practice requires chemical disclosure with the trade name of each additive, its purpose and concentration in the fracking fluid, and its chemical composition to be publicly available.

As the exact chemical mixture changes depending on the depth, geology, and other characteristics of a given well, individual disclosure of the components of fracking fluids used for each well is necessary. The requisite disclosure of chemicals should be linked to the environmental impacts associated with these substances instead of the purpose for which the substance is used disclosure requirements could for example extend to chemicals within the fuel used to generate electricity on the site.

vi. **Disclose spills and other incidents or hazards**. When spills and other damages occur this should be immediately disclosed, not only to the appropriate regulators under the DEA and DMR, but also to the public. This disclosure facilitates damage limitation and promotes public good faith. Information of incidents or damages associated with the applicant on other sites must also be made available to the regulators as part of the application process. This enables regulators to assess the historical performance of applicants and assess the substance behind promises for future performance.

vii. **Protect and promote disadvantaged and vulnerable communities**. Disclosure and engagement regulations must provide for the particular needs and challenges of disadvantaged and vulnerable communities. The NEMA principles require that environmental justice is pursued so that adverse environmental impacts are not distributed to the unfair detriment of any person, particularly vulnerable and disadvantaged persons (s. 2(4)(c)). The principles also uphold equitable access to environmental resources, benefits and services (s. 2(4)(d)).

C. *Site selection*

i. **Choose well sites in order to avoid or (if avoidance is not possible) minimise and remedy impacts on local community, heritage, existing land use, individual livelihoods and ecology**. The choice of well site needs to be based on the subsurface geology and to account for considerations including populated areas, existing land use, the natural environment and ecology, existing infrastructure and access roads, water availability and accessibility, disposal options, seasonal restrictions and heritage. Some of these aspects are explored in greater detail at sections (ii) to (x) below. Due consideration of appropriate elements, together with a comparative evaluation of feasible alternatives, can avoid or mitigate later problems.

ii. **Account for geological structures when deciding location of drilling or fracking**. The dolerite dykes and sills and kimberlite fissures in the Karoo, no matter the depth of the fracking activity, introduce the risk of migration pathways for fracking fluids, gas (such as methane) and pollutants to reach water resources. Additionally, pre-existing faults in rock formations can extend fractures and increase the seismic impacts of fracking. Geological assessments can be achieved with the use of magneto-telluric equipment (which measures the earth's magnetic fields) or seismic studies (which evaluate rock composition and activity).

iii. **Use existing infrastructure and accessible resources**. Where possible, dependant on the competing demands for such resources. Activity should not be permitted where the shortage of essential resources in the area (in the Karoo, the limited water resources) necessitates the importing of such resource inputs, with the associated environmental impacts.

iv. **Account for water availability and accessibility**. In accordance with the American Petroleum Institute provisions, prior to the grant of environmental authorisations and associated rights, potential water resources in the area must be studied and hierarchically ranked so as to prioritise non-potable water resources in consultation with local planning officials, the municipality and local water users. The authority must also consider the distance to the proposed water source, and ensure that the proposed source is to be used in a manner that does not harm existing and future water uses. The ground and surface water reserve for the Karoo must be established before any right is granted, including any water use licence. Should the proposed water source entail the drilling of boreholes to exploit unutilised aquifers, this use should only be allowed following the monitoring of groundwater levels in the general area.

v. **Account for waste disposal options**. This includes the proposed methods of disposing waste water, such as drilling and fracking fluids. Such methods may need to be established on a site-by-site basis but the applicant must have a well-formed idea of its disposal options prior to site selection.

vi. **Account for cumulative and regional impacts**. The significant amount of activity associated with each well is greatly exacerbated by the large number of wells required for unconventional gas extraction. Account must be taken of the cumulative environmental effects before rights or licences are awarded. This is particularly important in view of fracking's extensive water requirements. With regard to some impacts, for example those associated with land use and transportation, requiring that multiple wells are drilled from one pad can reduce the environmental footprint.

vii. **Account for proximity between new "fracking wells" and pre-existing conventional wells**. The pressure exerted by fracking can heighten the risk of blowouts in pre-existing conventional wells. As such, an assessment of cumulative effects must extend beyond a consideration of the activity associated with fracking wells to the interactions between these wells and proximate conventional wells.

viii. **Protect or exclude environmentally sensitive and significant areas**. The Square Kilometre Array and the South African Large Telescope are protected by the Astronomy Geographic Advantage Act, 2007 (AGAA). We commend the respectful stance of the proposed fracking regulations for the provisions of the AGAA. Appropriate monitoring and enforcement is required to ensure the real effect of this respect.

The National Environmental Management: Protected Areas Act, 2003, prohibits "commercial prospecting and mining activities" in a special nature reserve, national park or nature reserve, in a protected environment (without the written permission of the Minister of Mineral Resources),

a world heritage site, marine protected area or specially protected forest area or reserve (as declared under the National Forests Act, 1998). These same protections are extended to exploration and production activities in the National Environmental Management: Protected Areas Amendment Bill [B28B-2013] but have yet to be brought into effect. Additionally exploration and production activities should be restricted in:

- declared threatened ecosystems under the National Environmental Management: Biodiversity Act, 2004;
- mountain catchment areas, as defined under the Mountain Catchment Areas Act, 1970;
- sites protected under the Convention on Wetlands of International Importance especially as Waterfowl Habitat (the Ramsar Convention);
- heritage areas in terms of the National Heritage Resources Act, 1999; and
- habitat of species that are threatened or protected, as defined under NEM:BA Notice 389 of 2013.

ix. **Respect zoning schemes.** Sections 48(1) and (2) of the MPRDA provide that no mining may occur on land comprising a residential area except if the Minister of Mineral Resources is satisfied that this activity is desirable:

1. taking into account the sustainable development of the mineral resources and the national interest;
2. applying the framework of national environmental management policies, norms and standards; and
3. considering the interests of other mineral rights holders. The MPRD Bill extends these provisions to approved town planning schemes. Any exemptions granted by the Minister of Mineral Resources must respect the constitutional competencies of the relevant local municipality in accordance with the applicant land use legislation (including spatial development frameworks and integrated development plans). Moreover, site selection should be proactively guided by the Mining and Biodiversity Guidelines and be informed by available bioregional biodiversity maps, avoiding activity in Critical Biodiversity Areas.

x. **Use controlled fracking techniques only upon the ascertainment of a reserve shown to be economically recoverable following a proper and controlled exploration process.** The ascertainment of such a reserve should account for the considerations of the economic impact assessment outlined at D (iv) below.

D. *Ensuring a consistently high level of environmental and social performance*

i. **A pre-feasibility assessment.** Before environmental authorisations or any licences are granted, a pre-feasibility assessment is required at the landscape level: An expert-driven risks-based assessment should be undertaken to understand the impact that unconventional gas mining may have on South Africa's water, environmental and socio-economic resources and will provide scenario-based solutions that should be used to limit these impacts. The risk assessment will inform the proposed regulations.

ii. **Undertake a comprehensive environmental impact assessment prior to both exploration and production**. This will require hydraulic fracturing to be listed as an activity on Listing Notice 2 of the EIA Regulations (failing which exploration and prospecting, once the pre-existing mining related listings commence following the environmental management of mining by NEMA from 7 December 2014, will only require a basic assessment). This must have due regard for cumulative environmental impacts and assessment and the comparison of feasible alternatives and must look at the proposed developments on both a project level and well-by-well basis. At the very least, environmental impact assessments must entail a comprehensive assessment of the environmental impacts of each developmental stage of the well, including impacts that manifest after well closure, and must include the assessment of: ancillary impacts (truck traffic, diesel electricity generation etc.); the control and containment of emissions; the exclusion of environmentally sensitive areas; sustainable economic development; regional water uses and stresses; biodiversity impacts and contingency planning. Sustainable development requires the balancing of competing needs in order to achieve the "best practicable environmental option" which "provides the most benefit or causes the least damage to the environment as a whole, at a cost acceptable to society, in the long term as well as in the short term" (under NEMA sections 1 and 2(4)(b)) whilst applying a risk averse and cautious approach, and under what conditions this should be approved. As such, it is essential that the significance of all impacts and risks and the likely trade-offs are set out for decision makers.

These assessments must be made available for public comment in accordance with element a above.

Should the proposed fracking regulations be passed under the MPRDA (as appears to be the intention), the provisions of the MPRDA Regulations in relation to environmental assessments shall apply, at least for the period up to 7 December 2014. Regulation under NEMA (set to operate in respect of mining activity from 7 December 2014) presumes the commencement of listed activities both indirectly and directly related to fracking to allow for the operation of NEMA's EIA requirements. As fracking is necessary even at the exploration stage, fracking during this stage requires more extensive environmental assessment than that necessitated by prospecting under the MPRDA regulations.

iii. **Consider social impacts**. An environmental impact assessment must extend beyond biophysical impacts and include the impacts of the proposed activity on the human environment to allow for the proper assessment of competing needs and feasible alternatives. This assessment must include the consideration of impacts on: stakeholders' sustainable livelihoods; health and socio-economic wellbeing (including a sense of place); and access to infrastructure and services (including changes in access to, efficiency of use of and substitutions for affected resources).

iv. **Consider economic impacts**. This assessment, combined with the (overlapping) considerations within the assessments of the social and environmental impacts outlined above, ensures that the equitable distribution of costs and benefits associated with the proposed fracking is properly considered. A full economics study is particularly necessitated by the burst of initial production followed by the long periods of relatively low production typically associated with shale gas (the "boom and bust perspective"). The assessment must include an analysis of energy returned by

fracking compared to energy invested in all activities associated with the well, and the implications of irreplaceable resource loss against the boom and bust perspective.

Apply independent environmental evaluation and verification. Credible third party certification encourages public acceptance and facilitates adherence to best practice. Whilst the MPRDA makes no provision for independent environmental evaluation, the provisions under section 2(4)(l) of NEMA read with the EIA Regulations provide for the appointment of an independent expert panel to review and advise competent authorities on all scoping and environmental impact reports.

v. **Consistently and continuously assess water supply and quality**. This assessment is explored further below.

vi. **Minimise disruption of operations**. With the unknown and potentially pervasive environmental impacts of fracking and its associated activities, it is particularly important that operations are controlled in an environmentally and socially responsible manner. The expansion of local infrastructure and development in an environmentally sustainable manner in line with the exploration and production activities can be hindered by the potentially significant delay between the start of the development and the realisation of profit. As such, both the right holder and the government must be required to continuously invest part of the revenue from the operations in the sustainable development of the relevant areas.

vii. **Limit fracking activity during the exploration phase**. In the exploration stage, the wells are primarily used for collecting data, evaluating productivity, and developing plans for extraction during the production stage. However, some fracking activity may be necessary to access the unconventional gas needed for these preliminary assessments. Any fracking at this preliminary stage must be strictly limited and conducted only after comprehensive testing of wells, casings and other involved mechanisms (including mechanisms for waste disposal).

viii. **Implement minimum depth limitations on fracking**. An appropriate minimum depth limitation prevents fracking above a certain depth and is based on local geology and the risk of communication with fresh water aquifers. In the Karoo such a limitation must account for the complex hydrogeology and the prior experience of groundwater travelling long distances. In this context, the limitations of the proposed fracking regulations are insufficient.

ix. **Ensure responsible waste disposal**. Prior to the commencement of each relevant stage, operators must have developed fluid transport and waste management plans with the appropriate infrastructure for treating, reusing and disposing of waste. Recycling and reuse of fracking fluids and liquids must be prioritised with strong storage and containment measures on-site. (See E (iv) below for the specific treatment of waste water.)

x. **Control ancillary activities**. It is estimated that site construction, drilling and fracking requires around 1 150 truck visits per borehole. Additional pipelines, roads and other infrastructure will need to be constructed to ensure access and safe transportation and storage of gas, chemicals and waste. Diesel generators are often used to produce electricity. Environmental concerns associated

with these ancillary activities include air, traffic, noise, dust and light pollution. Account must be taken of the environmental effects of such associated activities and the relevant laws that control such activities. In many instances noise abatement measures, aesthetic measures (to reduce the visual impact of well sites), measures for alternative power sources and adequate road construction, surfacing and traffic regulations (to prevent noise, dust and general disturbance) will be required. Mitigation of ancillary activities' (roadkill, light pollution, noise pollution) impacts on wildlife must be required.

xi. **Undertake environmental assessments at each developmental stage**. Unconventional oil and gas developments generally proceed in a more incremental and less defined sequence than conventional developments. Multi-stage unconventional developments may require simultaneous operation of the different regulatory approvals and permits applicable to the different stages. Regulators need to be aware of these multi-stage developments and of the potential effects of one stage on the simultaneous functioning of another.

xii. **Ensure environmental rehabilitation**. Industry best practice must be followed up to and beyond well closure so as to ensure complete well isolation. Rehabilitation must occur incrementally as well production decreases.

There should be a standard specified to which all sites should be rehabilitated, and ideally this should be final, total and returning the land in a given area to some degree of its former state with accompanying restored social and natural functions. There should be clear guidelines given on the requirements for rehabilitation, given the extensive nature of the road and pipeline infrastructure associated with unconventional shale gas mining.

As a condition of the applicable rights or licences, industry stake holders should be required to pay into an environmental trust to be used to remediate long term environmental pollution and degradation (NEMA section 24P). This trust should be used as insurance should the polluter not have sufficient funds to pay for the damage, goes insolvent, or if the damage is not traceable to specific polluters. The financial provision for rehabilitation measures is further detailed under E (i) below.

xiii. **Apply precautionary principle throughout**. The precautionary principle is particularly applicable to well closure which involves looking many years into the future to assess the probability and extent of leaks that may occur.

xiv. **Undertake regional-scale strategic environmental assessments**.[19] As the pervasive effects of fracking are likely to be felt at a regional level, environmental impacts should be assessed at that level. **However**, the SEA alone is simply a process, and the aim of such an SEA should be clear. The SEA also needs to take into account social and economic aspects and should not replace the requirement of a risks-based assessment, referred to in D (i) above.

Critical Biodiversity Area maps should be developed for the applicable districts/regions before the onset of fracking.

xv. **Continuously improve regulations and operating practices**. If a technique is found to unsuccessful then it should no longer be approved.

E. *Responsible water use, storage, treatment and disposal*

i. **Avoid water pollution and contamination**. Those living in the Karoo will face serious water problems if the Karoo's shallow aquifers or surface water are polluted by fracking and its associated activities (including spills, leaks, poor treatment and inadequate disposal techniques and subsurface filtration). Stringent measures must be put in place to avoid water pollution and make the incidence of such pollution highly unlikely. For example, the use of drilling additives suitable for drilling through potable water supply aquifers should be prescribed and the use of reserve or tail ponds should be prohibited. Where complete avoidance is not possible, measures must be implemented to reduce and remedy the effects of water pollution. Due to the specialised and untested nature of fracking, we suggest the monitoring of any potential water pollution (together with associated enforcement measures as necessary) be undertaken by the DWA officials that form part of the a specialised fracking regulation unit outlined above. Evaluation must occur throughout the various stages of the fracking process, and results must be made public against acceptable standards.

   The proposed fracking regulations appear to provide that the pollution of useable groundwater must not exceed 10 000 mg/l Total Dissolved Solids (this provision is unclear because of the omission of a measure relative to this baseline). This baseline is concerning and wholly inadequate in light of the South African Water Quality Guidelines, 1996, which provide that health effects related to total dissolved solids are minimal at concentrations below 2 000 – 3 000 mg/[R] Total Dissolved Solids. According to these guidelines, short-term consumption of concentrations above 3 000 mg/[R] Total Dissolved Solids leads to disturbance of the body's salt balance whilst high concentrations lead to noticeable short-term health effects.[20]

ii. **Account for whether there is enough water or other potential water resources to support ecologically, socially and economically viable fracking and associated activities**. Such an evaluation can take the form of regional scale Strategic Environmental Assessments, undertaken by the DEA according to the DEA guidelines, in consultation with the DMR. Any evaluation must account for the maintenance and compliance of the water "reserve" (as required under the NWA) which entails the water quantity and quality required to:

   1. satisfy basic human needs, both now and in the reasonable future; and
   2. protect aquatic ecosystems so that ecologically sustainable development and use of the relevant water resource is secured (as yet not established for the Karoo). Groundwater should be protected in an integrated manner together with surface water, to adhere to the principles of integrated water resource management. Baseline and ongoing water monitoring of source supplies is required. Potable water should not be used.

iii. **Reduce freshwater use**. Regulatory measures must ensure operators use water efficiently and reuse and recycle it where possible (particularly during the fracking process).

iv. **Store and dispose of produced and waste water lawfully and safely**. To the extent that this is not already regulated under the NWA and NEMWA, regulations must set and enforce appropriate standards for safe water storage, extending to the use of storage tanks instead of open pits, and appropriate technology for waste water treatment. Regulations must consider the availability and proximity of fresh water supplies and disposal options, implement control measures for volatile organic compound (VOC) emissions from flowback and produced water and enforce the operator's responsibility in accordance with developing best practice standards.

Best practice for the management of flowback and produced water should be specified. Each disposal option must be carefully assessed and accord with water, waste management and municipal regulations.

Regulators must account for the fact that, because of the potential long-term benefits of using treated water and the social and environmental costs of waste discharges, the least financially costly solution for operators is not necessarily the optimal solution for sustainable development.

Industry best practice provides for the use of 'green completions' for the separation of flowback water from natural gas other compounds to prevent the venting of toxic gas and facilitate gas capturing.

v. **Minimise use of chemical additives and promote environmentally friendly alternatives**. Requiring the disclosure of fracking fluid chemicals should incentivise innovation of environmentally friendly alternatives. The goal must be the development of additives that do not impair groundwater quality, even if they do migrate or spill, and techniques that reduce the need to use additives.

F. *Isolating wells and preventing leaks*

i. **Ensure strong well design, integrity and construction that complies with best international practice** on matters like well preparation, mud removal, casing running and materials, cement placement and composition, effective testing, and contingency planning. This is in order to:

1. isolate productive zones;
2. protect groundwater resources;
3. properly execute fracking and ensure that the hydraulic fractures do not extend beyond gas-producing formations; and
4. contain hydrocarbons. Regulations must ensure complete well isolation.

ii. **Apply an early warning monitoring system in the event of depletion or pollution of specified resources beyond specified levels**. In line with section B above, the public must be made aware of warning signs so as to be able to implement any precautionary measures.

iii. **Prevent and contain surface spills**. Stringent procedures, properly trained personnel and readily available spill equipment are essential to prevent and contain spills that do occur. The risk of accidental waste discharge can be reduced by using closed storage and separation tanks for fluid disposal. A system of penalties for spills should be prescribed in the regulations.

iv. **Ensure emergency response plans are robust and match the scale of risk**. A major hazard of well drilling is the risk of blowout, or of rapid and uncontrolled change of underground pressure, that can cause spills or fluid releases underground. Appropriate blowout procedures must be followed with any incidents reported promptly. Emergency response plans must be clearly linked to the likely significance of impacts and risks with appropriate indicators and monitoring. These plans must provide assurance "beyond a reasonable doubt" that planned measures in the event of accidents, emergencies and pollution will adequately remedy hazards to health and wellbeing in a timeous manner. The plans must provide for adequate capacity for implementation and monitoring.

G. *Eliminating venting and minimising flaring and other emissions*

i. **Target zero venting and minimal flaring of natural gas**. There must be specific restrictions on flaring and venting and specific requirements to install equipment that minimises emissions. "Green completions", which separate flowback water from natural gas without gas flaring is industry best practice. These are widely accepted in the USA and are both economically and environmentally beneficial in that they enable the recovery and marketing of gas produced during the completion stage of the well.

The proposed fracking regulations require only that, where it is "technically infeasible" to "minimise" fugitive emissions by methods including storage, these emissions must be flared. There is no reason why an operator should not be able to employ the storage and separation mechanism of a green completion as is industry best practice-operators should not be allowed the "soft" and destructive alternative of flaring. (According to the proposed fracking regulations, technical infeasibility is to be established based on a "site-specific analysis". However, the factors accounted for in such an analysis are not detailed.) Additionally, the regulator needs to specify targets so as to substantiate and control what "minimise" entails.

ii. **Reduce air pollution from fracking and associated activities**. Concern for methane and other emissions extends beyond the production stage to emissions resulting from associated activities such as those involved in transportation and distribution. There must be strict controls requiring the capture of methane (or other VOC's) and of air pollutants in general – Colorado State requires a VOC capture technique with more than 95% efficiency. The proposed fracking regulations set no such targets. Whilst pollution from vehicles and equipment may be controlled by existing environmental and fuel efficiency standards, fracking regulations must account for the scale of use necessitated by the wells.

H. *Compliance monitoring and enforcement*

i. **Apply a comprehensive licensing system**. This should include requirements for consistent testing, contingency planning, stringent construction and drilling safeguards, constant pressure monitoring and reporting against acceptable standards.

All licences issued for fracking must be in the public domain – published on authorities' and the licence holders' websites with hardcopies available on site, at the local municipal offices and in the public libraries of all affected communities.

ii. **Apply constant and consistent testing and monitoring**. The different developmental stages of the well require consistent monitoring, particularly when multiple fracking stages are conducted. Steel casing and cement of the wells must be consistently monitored for strength and composition-cement composition can be compromised by the different pressures and chemicals conducted in the various stages. Seismic activity must be consistently monitored throughout the life of the well. Many US states and other nations require that companies keep log books of wellbore stratigraphy and cement bond strength which are then reviewed by authorities.

Testing records must also be kept of waste disposal, including the disposal of wastewater and gas. Testing includes pressure and acoustic testing.

Frequency of compliance monitoring – by government inspectors and by independent auditors – must be set by the licensing and competent authorities and strictly adhered to.

All compliance inspection reports must be in the public domain – published on authorities' and licence holders' websites with hardcopies available on site, at the local municipal offices and in the public libraries of all affected communities.

iii. **Match anticipated output levels with sufficient permitting and compliance staff, equipped with the appropriate knowledge and incentives**. Well-funded, suitably skilled and motivated regulators are essential to the responsible and sustainable development of fracking. To achieve this, it is recommended that the following obligations be imposed by law:

1. The licence holder must bear the employment cost of one or more (determined proportionally to the size of operations) government inspector familiar with and experienced in compliance monitoring of fracking activities, but who reports directly to authorities (preferably the multi-department unit referred to earlier).
2. The licence holder must bear the expense (determined proportionally to the size of operations) of training existing inspectors to build capacity and transfer knowledge regarding technical aspects of fracking and its environmental impacts.
3. The local community (with the appropriate training and motivation) can assist in this compliance function by being tasked with the raising of alerts after becoming aware of areas for concern.

iv. **Apply strict enforcement and penalties (criminal and administrative) in the event of non-compliance**. Over and above the usual remedies such as suspension or revocation of licences, licences should provide for significant administrative penalties in the case of violations of licence conditions and/or legislative provisions, up to a maximum of the higher of R20 million or 10% of turnover or 10% of gross asset value, whichever is the highest. These penalties must be determined by factors that include:

1. the extent of the violation;
2. the impacts of the violation;
3. the possible remediation measures and the extent to which these have been undertaken by the violator; and
4. the financial advantage gained by the violator as a result of the violation.

Civil penalties are in addition to any criminal penalties that may be levied upon successful prosecution. All enforcement action taken by authorities must be in the public domain – published on authorities' and licence holders' websites with hardcopies available on site, at the local municipal offices and in the public libraries of all affected communities.

I. *Financial provision*

i. Financial provision for rehabilitation must be peer reviewed by the independent panel appointed for the assessment of EIAs referred to above.

ii. Financial provision must be in respect of all direct and indirect environmental and social impacts associated with fracking related activity, including long-term water quality issues and site-specific conditions.

iii. Financial provision must be:
1. adjusted for inflation;
2. annually assessed and adjusted (if necessary) by the licence holder in accordance with the threat of environmental liability at that time;
3. sufficiently detailed;
4. guarantee the availability of sufficient funds to undertake the approved works programme, to undertake the approved environmental management programme, to undertake the rehabilitation of the impacts of the fracking and related activities, to undertake decommissioning and closure of the operation, and to undertake remediation of latent and/or residual environmental impacts which become known in the future; and
5. ring-fenced against insolvency;[21]

iv. The amount and form of financial provision must be in the public domain – published on authorities' and licence holders' websites with hardcopies available on site, at the local municipal offices and in the public libraries of all affected communities. The master rates and approach must be revised and published before drilling starts.

ENDNOTES

1 The deadline for comments in respect of the proposed fracking regulations was 14 November 2013. On 13 November 2013, the CER received a letter from the Director-General of the DMR granting us until 4 December 2013 to submit comments. This indulgence was apparently not extended to other organisations who had made similar requests, and the CER certainly requested for the deadline to be extended generally.

2 The deadline for comments in respect of this declaration was 15 November 2013.

3 Paul Vecchiato 'Fracking draft regulations released' *Business Day Live* 17 October 2013 http://www.bdlive.co.za/business/energy/2013/10/17/fracking-draft-regulations-released.

4 Published on 11 September 2012.

5 CCT 103/11 [2012] ZACC 7 paragraph 5.

6 NEMA sections 2(3) and 2(4)(a).

7 In the case of *Director: Mineral Development, Gauteng Region and another v Save the Vaal Environment and others* 1999 (2) SA 709 SCA, the Supreme Court of Appeal confirmed the fundamental nature of the public's right to be heard as a component of lawful, reasonable and procedurally fair administrative action, particularly in light of the "enormous damage" that can be caused by mining activity (at 710G). In the 2005 *Earthlife Africa* case (*Earthlife Africa (Cape Town) v Director-General: Department of Environmental Affairs and Tourism and Eskom Holdings* 2005 (3) SA 156 (C)), the Court took the view that this right to be heard can apply at various stages in an application process.

8 In *Aquafund (Pty) Ltd v Premier of the Western Cape* 1997 (7) BCLR 907 (C) 916E it was held that "[i]f it is accepted that every person is entitled to lawful administrative action, it must follow that in a legal culture of accountability and transparency … manifested in the constitution, a person must be entitled to such information as is reasonably required by him [Page 5–42] to determine whether his right to lawful administrative action has been infringed or not. If a person is not able to establish whether his rights have thus been infringed, he will clearly be prejudiced."

9 http://www.api.org/environment-health-and-safety/environmental-principles as accessed on 6 November 2013.

10 http://www.iea.org/publications/freepublications/publication/WEO2012_GoldenRulesReport.pdf.

11 http://ec.europa.eu/environment/integration/energy/pdf/fracking%20study.pdf.

12 http://www.epa.gov/airquality/oilandgas/actions.html.

13 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/225826/About_Shale_gas_and_hydraulic_fracking.pdf.

14 This ignores the commencement of intrinsic provisions of the MPRDAA 2008 only on 7 December 2014.

15 http://cer.org.za/wp-content/uploads/2013/09/Joint-Submission-on-MPRDA-Amendment-Bill-6-Sept-2013-Appropriate-authority-for-environmental-regulation.pdf.

16 http://www.dmr.gov.za/about-us.html.

17 MPRDA s. 70 as substituted by MPRDA Bill s. 46.

18 NEMLAB 3 introduces the concept of "environmental mineral resources inspectors" to be designated by the Minister of Mineral Resources from the DMR. Whilst we maintain that these inspectors should operate under the authority of the Minister of Water and Environmental Affairs, we commend NEMLAB 3's integration of compliance and enforcement officials from the DMR and the Department of Water Affairs (DWA) into the Environmental Management Inspectorate.

19 We understand that the departments of Environmental Affairs and Water Affairs are planning a collaborative strategic environmental assessment for the Karoo.

20 Also to be read with SABS 241: Specifications for Drinking Water.

21 These are recommendations made in WWF-SA's 2012 report Financial Provisions for Rehabilitation and Closure in South African Mining, available at http://www.wwf.org.za/media_room/publications/?6620/miningreport.

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COMPANY INFORMATION

The Centre for Environmental Rights is a non-profit company with registration number 2009/020736/08.

The CER is accredited as a non-profit organisation with the Department of Social Development under the Nonprofit Organisations Act, 1997 with registration number NPO No. 075-863.

The CER is also registered with the South African Revenue Service as a public benefit organisation under the Income Tax Act, 1962 with registration number PBO No. 930032226.

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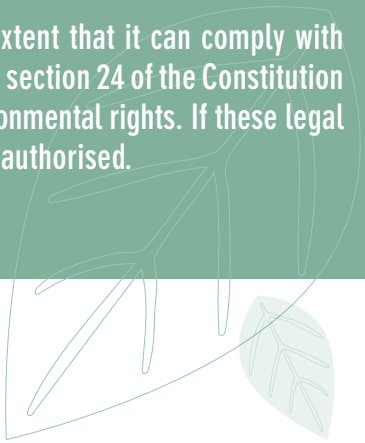
Fracking must only be authorised if and to the extent that it can comply with minimum regulatory requirements consistent with section 24 of the Constitution and legislation promulgated to give effect to environmental rights. If these legal requirements cannot be met, fracking cannot be authorised.



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