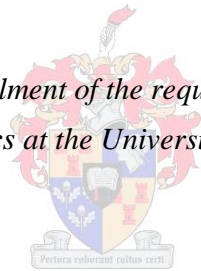


**The discursive construction of hydraulic fracturing in
South Africa: A critical analysis of media texts from
2011 to 2012**

by
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******Thesis presented in partial fulfilment of the requirements for the degree
*****MA in General Linguistics at the University of Stellenbosch*



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Cr tkl'2014

Acknowledgments

I would like to acknowledge my father for his strong-willed persona, his humour, his love, support and motivation, as well as and most importantly, for the opportunities he has provided for me throughout my life and pushing me to always do my best for that is all I can do.

I would like to thank my mother for her continuous support throughout my life, specifically my University career. Without her love, compassion, motivation and support by always being available to just listen and never judging me, I would not be able to succeed in many of the things that I set my mind to.

My sister, without her inspiration, advice and support throughout my life, specifically my post-graduate studies, I would not have succeeded.

Many thanks to my colleagues for always being concerned and considerate, taking my academics into regard.

Lastly, I would like to thank Taryn for her constant assistance, support, advice, availability, concern and constructive criticism. This thesis would not have been a success without her. I was extremely privileged to have the opportunity to work with her.

A special thanks to the theorists and researchers of CDA.

Declaration

By submitting this thesis electronically, I declare that the entirety of the work contained therein is my own, original work and that all sources that I have used or quoted have been indicated and acknowledged by means of complete references. I also declare that this thesis, in its entirety or in part has not been submitted at any University for obtaining any qualification.

Simóne Smit

November 2013

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Abstract

Hydraulic fracturing is a geo-engineering procedure designed to extract shale gas from below the earth's surface. Shale gas is often considered a natural, alternative source of energy that has the potential to increase global energy supplies but the scientific literature is not unanimous regarding the implications that hydraulic fracturing may have, and whether it should continue (Vermeulen 2012).

Given the contentious nature of hydraulic fracturing, this study investigates the ways in which hydraulic fracturing is represented in South African media texts. The study draws on Gee's (1996) model of critical discourse analysis (CDA), which views discourse as a means to represent and reproduce social practices. Thus, the study conceptualises hydraulic fracturing as a social practice with an affiliated discourse or discourses, which represent or construct the process of hydraulic fracturing, as well as the participants involved and context in which it takes place. Furthermore, these discourses are also presumed to have the power to legitimise, and thus perpetuate hydraulic fracturing, or to critique it.

Subsequent to an examination of 32 South African news articles, and a close and critical analysis of four of them, this study reveals that hydraulic fracturing is presented in both positive and negative ways. Where positive constructions prevail, writers draw on the perspectives of those working in multinational corporations (MNCs) to construct shale gas as a way to increase energy supplies and achieve economic prosperity. Where negative constructions prevail, writers draw on the perspectives of environmentalists to construct hydraulic fracturing as an environmentally-harmful activity that depletes natural resources. In doing so, the study not only highlights the media's role in perpetuating confusion about hydraulic fracturing, but highlights dominant ideologies that give rise to common representations of hydraulic fracturing in media texts.

Opsomming

Hidrobreking is 'n geo-ingenieursprosedure waardeur ondergrondse skaliegas ontgin word. Skaliegas word dikwels beskou as 'n natuurlike, alternatiewe energiebron met die potensiaal om die wêreld-energievoorraad te verhoog, maar die wetenskaplike literatuur is verdeeld oor die effek van hidrobreking en die voortsetting van hierdie praktyk (Vermeulen 2012).

Gegee die netelige aard van die onderwerp, word daar in hierdie studie ondersoek gedoen na die wyses waarop hidrobreking voorgestel word in Suid-Afrikaanse mediatekste. Die analise word gerig deur Gee (1996) se model van kritiese diskoersanalise waarvolgens diskoers dien as instrument in die voorstelling en voortsetting van sosiale praktyke. As sodanig word hidrobreking in hierdie studie gekonsepsualiseer as 'n sosiale praktyk met een of meer gepaardgaande diskoerse wat die proses van hidrobreking, die deelnemers in hierdie proses asook die konteks waarin hierdie proses plaasvind, voorstel of konstrueer. Verder word daar veronderstel dat hierdie diskoerse die krag het om hidrobreking te regverdig en sodoende voor te sit, of om dit te kritiseer.

Op grond van die bestudering van 34 Suid-Afrikaanse nuusberigte en 'n kritiese ontleding van vier daarvan, word daar bevind dat hidrobreking op beide positiewe en negatiewe wyses voorgestel word. In die geval van positiewe konstruksies steun skrywers op die uitgangspunte van persone in multinasionale korporasies om skaliegas te konstrueer as 'n manier om energievoorrade te verhoog en ekonomiese vooruitgang te bevorder. In die geval van negatiewe konstruksies steun skrywers op die uitgangspunte van omgewingsdeskundiges om hidrobreking te konstrueer as 'n omgewingskadelike aktiwiteit wat natuurlike hulpbronne uitput. Hierdie bevindinge beklemtoon die rol van die media in die voortgesette verwarring aangaande hidrobreking, asook die dominante ideologieë wat aanleiding gee tot algemene voorstellings van hidrobreking in mediatekste.

Table of Contents

Acknowledgments.....	i
Declaration.....	ii
Abstract.....	iii
Opsomming.....	iv
Chapter 1: Introduction to the Research Problem	1
1.1 Background.....	1
1.2 Situational context	1
1.2.1 Hydraulic fracturing in the Karoo.....	3
1.3 Media representations of hydraulic fracturing.....	5
1.4 Research aims and questions	6
1.5 Methodology.....	6
1.6 Chapter outline.....	8
1.7 Key terminology	8
1.7.1 Discourse.....	8
1.7.2 Critical discourse analysis.....	8
1.7.3 Hydraulic fracturing	8
1.7.4 Ideology	9
1.7.5 Social constructivism	9
1.7.6 Social practice	9
Chapter 2: Literature Review	10
2.1 Introduction.....	10

2.2 Critical discourse analysis.....	10
2.2.1 Discourse.....	11
2.2.2 Social practices.....	12
2.2.3 Power, ideology and discourse.....	13
2.2.4 Social constructivism	15
2.3 A critical perspective of media texts and media discourse	15
2.3.1 The power of media institutions.....	16
2.3.2 The genre of media texts	17
2.3.3 Media discourse	18
2.4 Overview of literature on hydraulic fracturing discourses	19
2.4.1 Hydraulic fracturing discourse represents the natural environment	19
2.4.2 Hydraulic fracturing discourses draw on neoliberal logic and discourses	21
2.5 Conclusion	25
Chapter 3: Methodology.....	26
3.1 Introduction.....	26
3.2 Research questions.....	26
3.3 Hypothesis.....	26
3.4 Qualitative research	26
3.5 Selection of texts.....	28
3.5.1 South African media	28
3.5.2 Newspaper publications	29
3.5.3 Selection process	30
3.6 Gee’s framework.....	32

3.6.1 Gee’s method of CDA.....	32
3.6.1.1 Prosody.....	32
3.6.1.2 Cohesion.....	33
3.6.1.3 Conjunctions	33
3.6.1.4 Contextualisation signals	33
3.6.1.5 Discourse organisation	33
3.6.1.6 Thematic organisation.....	33
3.7 Conclusion	34
Chapter 4: Data Analysis	35
4.1 Introduction.....	35
4.2 The genre of media texts.....	35
4.3 Shared discursive constructions of the practice of hydraulic fracturing.....	38
4.4 Discursive construction of the company.....	42
4.5 Discursive construction of the South African Government.....	44
4.6 Discursive construction of environmentalists.....	45
4.7 Discursive construction of the public	46
4.8 Discursive constriction of the context.....	46
4.9 CDA analysis of four chosen articles.....	47
4.9.1 Article A: “Drakensberg and surrounds face fracking threat too, conservationists warn”, by John Yeld, 13 September 2011.	47
4.9.1.1 Prosody.....	48
4.9.1.2 Contextualisation signals	48
4.9.1.3 Cohesion.....	50

4.9.1.4 Discourse organisation	51
4.9.1.5 Thematic organisation	53
4.9.2 Article B: “Shell doing its best to make fracking safe, water friendly”, by Jan- Willem Eggink, 5 October 2011.	53
4.9.2.1 Prosody.....	54
4.9.2.2 Contextualisation signals	56
4.9.2.3 Cohesion.....	57
4.9.2.4 Discourse organisation	59
4.9.2.5 Thematic organisation.....	60
4.9.3 Article C: “A watchdog with strong bite”, by Michelle Nel, 5 July 2012.	61
4.9.3.1 Prosody.....	61
4.9.3.2 Contextualisation signals	61
4.9.3.3 Cohesion.....	64
4.9.3.4 Discourse organisation	64
4.9.3.5 Thematic organisation.....	66
4.9.4 Article D: “Karoo shale must be explored”, by Danie Vermeulen, 26 August 2012.....	66
4.9.4.1 Prosody.....	67
4.9.4.2 Contextualisation signals	68
4.9.4.3 Cohesion.....	70
4.9.4.4 Discourse organisation	71
4.9.4.5 Thematic organisation.....	73
4.10 Conclusion	73

Chapter 5: Conclusion	74
5.1 Introduction.....	74
5.2 Dominant representations of hydraulic fracturing	74
5.2.1 Positive representations of hydraulic fracturing	76
5.2.2 Negative representations of hydraulic fracturing.....	77
5.3 Summary of research aims and achievements	78
5.4 Recommendations for further research	79
References	81
Appendix A	92
Appendix B	94
Appendix C	142
Appendix D	144
Appendix E	146
Appendix F	147

Chapter 1: Introduction to the Research Problem

1.1 Background

Since the 1960s environmental concerns have become more prominent in public media and entered the realm of public and media debate on a global level (Straughan and Roberts 1999: 558). These concerns include pollution, the destruction of the ozone layer, global warming, climate change and the depletion of natural resources. For at least the past two decades, scholars have used methods of discourse analysis to investigate the ways in which these environmental issues are discursively constructed and represented in public and corporate texts (see, for example, Alexander 2009; Bowers 2010; Burchell and Cook 2006; Dermitt 2002; Dryzek 1997; Harré, Brockmeier and Mühlhäusler 1999; Litfin 1994). Such studies are not only concerned with common representations or discourses of environmental issues, but also with powerful ideologies that give rise to common representations and which cause the public to respond and react to environmental issues, often in predictable ways.

The aim of this thesis is to investigate media discourses of hydraulic fracturing in a South African context. As a form of geo-engineering, hydraulic fracturing receives much public and media attention and is represented in both positive and negative ways. Positive representations construct hydraulic fracturing as a safe method of extracting shale gas, which is simultaneously referred to as an “alternative” or “natural” gas and a way to reduce a country’s carbon emissions and increase their economic capital. Negative representations focus on the contamination of local water supplies and frequently draw on dystopic imagery to construct a future world that is both barren and desolate. This thesis investigates common media representations of hydraulic fracturing in a South African context. By using methods of critical discourse analysis (CDA), the primary aim is to uncover hidden ideologies that give rise to common discourses about hydraulic fracturing in media texts.

1.2 Situational context

Hydraulic fracturing, also termed “fracking”¹, refers to a process whereby water is used at a very high pressure to drill and force open fissures in rocks to reach and extract shale gas buried deep under the earth’s surface (Howarth, Ingraffea and Engelder 2011: 272). Since

¹ For purposes of clarity and consistency, the term “hydraulic fracturing” will be used throughout this thesis.

shale gas is an alternative energy source², and the process of hydraulic fracturing has led to many technological advances, hydraulic fracturing has revolutionized the oil and gas industry, and has changed the roles and functions of many big oil and gas companies, including Royal Dutch Shell and British Petroleum (BP) (de Wit 2011: 3). Due to the key role that these companies play in hydraulic fracturing, they are often the focus of public and media discourses on hydraulic fracturing. On the other hand, given the power of these institutions as multinational corporations (MNCs), they also have the power to control public perceptions and debates about hydraulic fracturing (Bednarek and Caple 2012: 6; Wodak and Busch 2004: 111).

There are two primary ways to carry out the hydraulic fracturing process, namely vertical drilling or horizontal drilling (de Wit 2011: 2-4). Horizontal drilling is able to harvest shale gas resources from a larger geographical area than that of vertical drilling, and also reduces the number of well sites over the vast terrain (de Wit 2011: 3). This would mean that less construction is needed and therefore fewer natural habitats would be disturbed (de Wit 2011: 3). However, horizontal wells pose a threat to subsurface aquifers (where natural groundwater resources are located) as they can produce high seismic events, and require multi-directional hydraulic fracturing which uses up to 20 million litres of water, most of which remains underground and may contaminate subsurface aquifers, thus degrading the quality of the groundwater supply (de Wit 2011: 4). While vertical drilling remains the most common method of hydraulic fracturing, the scientific literature is not unanimous about the possible effects that can occur from either process (Vermeulen 2012: 154). This influences public debates and causes confusion about the advantages and disadvantages of hydraulic fracturing. On a global level, the same debate exists and there are many countries that have allowed or banned hydraulic fracturing due to its perceived threats or benefits: the United States (US), Canada, Australia and New Zealand have permitted hydraulic fracturing to take place in various locations, while countries such as China, Denmark, Saudi Arabia, Poland, Indonesia, the United Kingdom (UK), Ukraine, Italy, Germany and South Africa have granted exploration rights. Countries such as Spain, Tunisia, Uruguay and France are not involved in this process at all, and France has banned hydraulic fracturing entirely (Franco, Martinez and Feodoroff 2013: 4).

² A source of energy other than the burning of fossil fuels.

1.2.1 Hydraulic fracturing in the Karoo

On 7 September 2012, the South African Government (hereafter referred to as the Government) lifted the moratorium on applications to explore for shale gas. On 11 September 2012, Susan Shabangu, Minister of Mineral Resources, Godfrey Oliphant, Deputy Minister of Mineral Resources and Thibedi Ramontja, Director General: Department of Mineral Resources, briefed the media about this decision³. Since 2009, Shell has been particularly interested in gaining exploration rights in the Karoo (de Wit 2011: 3). These exploration rights will make it legal for Shell to explore the region and conduct a trial-run for hydraulic fracturing in the area. Since Shell's interest was made known to the public, much public debate has taken place, particularly in the Karoo region (de Wit 2011: 1).

The Karoo is a large, semi-desert region in South Africa which forms part of the largest ecosystem in the country (Davis 2012: 188). The Karoo region is divided into the Groot ("Great") Karoo, spreading from Touws River in the south to Murraysburg in the north-east, and the Klein ("Small") Karoo, which includes the towns of Oudtshoorn, De Rust and Uniondale. It is believed that the Karoo basin holds large shale gas deposits (de Wit 2011: 2-3). Being a semi-desert region, water is scarce and since hydraulic fracturing requires a large amount of water, the depletion of water resources is a major concern for locals and environmentalists (de Wit 2011: 5). Underground aquifers provide the area with sufficient water for animal and human consumption. Through the complex process of drilling, these aquifers may be subjected to dangerous chemicals which may contaminate the fresh water they contain. An essential aspect of the hydraulic fracturing process is water. In order for drilling to be successful, water (mixed with particular additives) is required to create the fractures that would release the gas. Considering the great amount of water required for such a task, many fears arise regarding ways in which the process could disrupt the scarce water supply. In the Karoo, there are four possible water sources which may be utilised in undertaking the hydraulic fracturing process: industrial hydraulic fracturing of underground aquifers, transporting surface water from elsewhere, channelling (desalinated) sea water from the coast, or using the water from the Gariep River (Vermeulen 2012: 151). Hydraulic fracturing can cause gas and hydraulic fracturing fluids to escape through small lesions in the pipes which would degrade the quality of local groundwater supply. Drinking water could

³ For the briefing see: <http://www.pmg.org.za/briefing/20120911-investigation-hydraulic-fracturing-briefing-minister-mineral-resour> For a summary of the government report, see <http://d2zmx6mlqh7g3a.cloudfront.net/cdn/farfuture/ofGIBNjNhwTf5RJ3LwxXL5MWqk10bXQjpQFgqWvnhI8/mtime:1381178185/files/docs/120911executivesummaryshale.pdf>

therefore be harmful to the inhabitants of this area (de Wit 2011: 5). It has also been stated that hydraulic fracturing in the Karoo will leave “irreparable environmental scars” (de Wit 2011: 1) on the Karoo landscape. Shell has undertaken not to use water from the underground aquifers, but will instead be channelling the resource from the ocean and possibly the Orange River (Fig 2011: 25 and 27). A great portion of South Africa relies on attaining water from the Orange River, so transporting and using river and/or sea water may resolve the water exploitation issue in this case. Subsequently, however, the issues of water transportation and waste management then arise.

In South Africa, the management of hazardous waste falls under provincial jurisdiction. This is problematic because most of the hydraulic fracturing will occur in the Eastern Cape, South Africa’s poorest, least resourced and most administratively weak province (Fig 2011: 27). Currently, most of the municipalities in the province are not coping with basic general household management and industrial waste as a result of strict budgets and lack of necessary human capital (Fig 2011: 27). The waste produced from hydraulic fracturing activities is a great concern for all South Africans as it involves more than contaminated water treatment and disposal; it also involves dust pollution from large-scale transportation of hydraulic fracturing resources on gravel roads, as well as the degradation of road- and building-site infrastructures (Fig 2011: 28; Vermeulen 2012: 151). If a country such as the US has found the disposal of hazardous waste challenging, with up to 25% of drilled wells having been recorded as transgressing the rules for safe waste management - a regulation that has proven difficult to enforce - the South African situation, according to Fig (2011: 27), is unlikely to cope any better with disposing of such hazardous waste, especially due to the lack of funding and human capital for “ordinary household and industrial waste”.

Apart from the perceived dangers of hydraulic fracturing, some believe that the process presents a way to “deliver new solutions to meet intergenerational equity” (de Wit 2011: 1) as well as to provide new employment opportunities for a country with a high un-employment rate (de Wit 2011; Fig 2012: 28). Some argue that not only does gas burn almost 50% cleaner than coal but also that, through drilling for shale gas, South Africa could meet the 2015 United Nations Millennium Development Goals (MDGs) target of poverty reduction, as well as reduce the carbon footprint of the country in accordance with the 2050 UN carbon-emission targets, ultimately enabling South Africa to become self-sufficient in energy sources (de Wit 2011: 1; Fig 2011: 25).

The effects of hydraulic fracturing in the Karoo need to be considered in the broader South African context as policies and management plans that exist elsewhere may not necessarily apply to the area, resulting in the need to develop new policy and management plans (Fig 2011: 25-26; de Wit 2011). The Karoo is considered to be a unique case due to dolerite rock being the main rock component, both on the surface as a result of erosion over many years, and underground (Vermeulen 2012: 149-150). This specific type of rock has not been a factor in hydraulic fracturing research and exploration elsewhere in the world. As a result, the South African situation is unique and has not been well-researched in effect. There are various factors involved that may have harmful effects on the environment, society and possibly the economy. Therefore, extensive research and public debate needs to take place. There has been no research undertaken in South Africa to prove on the one hand that the Karoo holds enough shale gas to be viably exploited, or on the other hand, to reveal the possible risks related to hydraulic fracturing in the South African context. As it stands, the existing research on hydraulic fracturing (in and from the US) and its potential dangers and benefits may be irrelevant to the South African context due to the great geological differences (Fig 2011: 24).

1.3 Media representations of hydraulic fracturing

The media play an important role in society because they frame issues as “newsworthy” and give preference to particular viewpoints while suppressing others, consequently constructing the identification and interpretation of the issue (Bosch 2012: 44). In much the same way, the media is a powerful force in framing public debates on and perceptions of environmental issues (Bosch 2012: 44). News articles are “socially constructed versions of reality” (Locke 2004: 54) and are thus not factual representations but rather representations of reality according to dominant political and social ideologies. Media discourses are considered to interact in complex ways, resulting in a power struggle for worldly knowledge, and can therefore be considered as a part of the process of meaning creation in society (Gramson and Modigliani 1989: 2). This creation of meaning in the context of media texts present language use as selective and misleading as a result of domineering political and social ideologies that are distributed and consumed by society (Burgess 1990: 139).

1.4 Research aims and questions

The aim of this study is to present a critical analysis of media representations of hydraulic fracturing in South Africa during the two-year period from the beginning of 2011 to the end of 2012. The primary research questions of the study are:

- a) How do media texts, from a variety of media publications, discursively construct the social practice of hydraulic fracturing?
- b) What ideologies are evident in, and dominate, these representations?

The hypothesis of this study is that, while common discourses and representations exist, different media texts and writers draw on either environmentalist or neoliberal ideologies when presenting the issue of hydraulic fracturing. Such a hypothesis can be verified or disproved in close analysis of selected, representative texts.

1.5 Methodology

This study will invoke on theories and methodologies developed within CDA, an interdisciplinary approach to discourse in analysing the selected texts. This means that other fields besides Linguistics are referred to in analysing the media texts. On a fundamental level, CDA takes a social constructivist approach to reality, meaning that analysts adopt the view that reality is not a “given” but is socially constructed and produced through complex social processes and practices (Fairclough 2001: 235; Tuominen and Savolainen 1997: 81). In addition, a primary aim of CDA is to investigate how social practices are discursively constructed, and, in turn, how discourses reproduce these social practices (Machin and Van Leeuwen 2007: 60-61).

Social practices are defined by Gee (2009: 25) as “(partially) routine activities through which people carry out (partially) shared goals based on (partially) shared (conscious or unconscious) knowledge of the various roles or positions people can fill within these activities”. Machin and Van Leeuwen (2007: 61) posit that social practices always have five elements, namely the participants or social actors, the participants’ activities and reactions towards the practice, the time(s) and place(s) in which the practice takes place, the dress and grooming as well as the tools and materials which are required in order for the practice to take place. As such, for the purposes of this study, hydraulic fracturing is conceptualised as a

social practice and is also constituted by the aforementioned five elements of a social practice.

Thus, from a CDA perspective, media discourses of hydraulic fracturing represent the social practice thereof and, in the process, legitimise or delegitimise this social practice (Machin and Van Leeuwen 2007: 61). In addition, critical approaches to discourse also consider the embeddedness of social practices in life and relationships, and therefore their implications for issues of solidarity and the distribution of goods and power (Gee 2009: 24). According to key CDA theorists like Fairclough and van Dijk, discourses are controlled by those with the most power (Bednarek and Caple 2012: 6, 29-32). The notion of ‘power’ is central to this study, as one of the aims of this study is to investigate the ways in which powerful institutions like the media, as well as MNCs (of which Shell is one example), are able to influence and shape the public’s opinions, perspectives and behaviours. In this study, the media plays a fundamental role in determining perspectives and ideologies of hydraulic fracturing, the environment, and major corporations. In line with CDA theory, this study views these “ways of presenting” as central to producing and reproducing social inequalities (Richardson 2007: 26).

CDA is thus an approach towards texts that acknowledges the influences involved in shaping discourses. It is a theory regarded as interpretative, contextual and constructive (Richardson 2007: 26-27). This thesis adopts Gee’s (1996) method or model of CDA which investigates five interrelated linguistic systems of the text. Locke (2004: 58) lists these five components as:

- 1) Prosody, or the ways in which words and sentences of a text are said and how they are emphasised;
- 2) Cohesion, or the ways in which sentences are connected to each other;
- 3) Organisation of discourse, or the ways in which sentences are organised into larger sections or arguments, ultimately reflecting the genre of the text;
- 4) Contextualisation signals, or the ‘cues’ by which speakers and writers indicate and represent the contextual situation and the participants of the text, and
- 5) Thematic organisation, or the way in which the themes of the text are indicated and developed.

Each of these five linguistic systems interrelates on at least one level, and therefore each system should be viewed with the other four in mind. As with every CDA framework, Locke

(2004: 58) points out that the analytical framework of Gee (1996) is, “an act of interpretation and therefore subject to contestation and critique”.

1.6 Chapter outline

Following this chapter, chapter two provides an overview of core literature related to both CDA and discourses of hydraulic fracturing and the environment. While the first part of this chapter aims to assist the reader in understanding the theoretical framework of this study, the second part looks at relevant and related research which will be incorporated into the data analysis of this study. Chapter three presents an overview of the methodology employed in this study, including an overview of how the media texts were selected and analysed. In chapter four, the analysis of the data is presented, drawing on the theoretical and methodological framework discussed in earlier chapters. Finally, in chapter five, concluding remarks are presented on the analysis and suggestions for further research are offered.

1.7 Key terminology

1.7.1 Discourse

Discourse is a representation of a particular way of perceiving social dynamics and practices. The latter are perceived, produced and reproduced as a resource to which people relate, associate and understand each other within particular ideological, historical and social spheres (Fairclough 2006; Richardson 2007).

1.7.2 Critical discourse analysis

CDA is a multidimensional approach to investigating how social practices are discursively constructed within a social constructivist approach to reality. Reality is perceived as not readily being “given” but rather as socially constructed and produced through social processes and practices (Fairclough 2001: 235; Tuominen and Savolainen 1997: 81).

1.7.3 Hydraulic fracturing

Hydraulic fracturing or “fracking” is a drilling process which targets gas buried beneath the earth’s surface. It involves drilling vertically into the earth’s surface until shale deposits are reached, fracturing the deposits through pumping a combination of water, sand and chemicals into the fractured deposit, thus enabling the shale gas to escape through pipelines to the

surface. The drilling process then continues horizontally so as to cover greater areas whilst limiting the number of wells within the area.

1.7.4 Ideology

An ideology is a set of beliefs or attitudes shared among members of a particular social group or institution which determines the discourse of the group or institution (Bloor and Bloor 2007: 10). These beliefs may not be conscious and may ascribe a hidden agenda which is evoked through language use.

1.7.5 Social constructivism

Social constructivism (or “social constructionism”) concerns the structuring and organising of social realities through communication with an aim to generate discourses which are constructed in order to represent realities. Language and knowledge are thus considered to be a dialogic process that draws on the “constructive nature of language use” (Tuominen and Savolainen 1997: 82).

1.7.6 Social practice

A social practice is a form of social activity that is considered to be stable in that each practice is regarded as an articulation of social elements that are constructed through discourse (Fairclough 2003: 25). These social elements are “dialectically related” (Fairclough 2001: 1) and shape discourses that are illustrative of various representations and perspectives of social life. Each social practice has various actors who present these discourses in different ways by constructing their own social order of the world around them (Fairclough 2001: 2; Machin and Van Leeuwen 2007: 61).

Chapter 2: Literature Review

2.1 Introduction

This chapter provides an overview of the literature that is pertinent to this study. Given that this study concerns media discourses of hydraulic fracturing in South Africa, it is necessary to investigate how hydraulic fracturing is commonly constructed and represented. It is also necessary to give a clear overview of the theoretical framework, the field of CDA, and a CDA approach to media texts and discourses.

There is very little research on media discourses of hydraulic fracturing. Thus, the researcher broadly investigated the discursive construction of the natural environment, MNCs and mining practices. As far as the natural environment is concerned, critical social theories take the natural environment as being socially constructed, while critical literature on MNCs often focus on the disproportionate amount of power that these institutions have to frame public discourses.

2.2 Critical discourse analysis

CDA is a form of critical social research that is regarded as both a theory and a method which aims to investigate the way that individuals and institutions use language. This type of analysis focuses on social problems and the role that discourse plays in the production and reproduction of power abuse (Richardson 2007: 1), as well as its role in resisting social inequalities (Richardson 2007: 6, 15). The specific method of CDA differs depending on the type of research being carried out and the data used. The objectives of the research determine the critical theory to be drawn upon in order to interpret the discourse, as well as the methodology to be implemented (Fairclough 2006: 11). Given the reliance on social theory, CDA is conceptualised as having a “multidisciplinary nature” (Bloor and Bloor 2007: 1), as well as being “interdisciplinary” and “transdisciplinary” (Fairclough 2003: 6, 9). This is because CDA makes use of and combines a wide range of perspectives and approaches to analysing texts (Fairclough 2003: 6). CDA is therefore complex as a theory and a method, as there are various approaches incorporating different theories across “virtually all disciplines in the humanities and social sciences” (Bloor and Bloor 2007: 2).

CDA is based on conceptualisations of language and grammar from Systemic Functional Linguistics (SFL) (Bloor and Bloor 2007: 2). SFL plays a role in CDA as it stresses the importance of social context in the production and development of language, and is concerned with words, sentences, grammar, longer texts and collections of texts (Bloor and Bloor 2007: 2). It is also concerned with the relationship between language and other aspects of social life and with the way in which language or discourse is used to achieve social goals (Bloor and Bloor 2007: 2; Fairclough 2003: 5).

Within the social sciences, CDA is strongly influenced by Foucault's notion of 'discourse' as related to and influenced by power dynamics (Locke 2004: 1). From a CDA perspective, social life is an interconnected network of diverse social practices and discourses (Fairclough 2003: 205). Thus, key notions in the theoretical framework of CDA are 'social practice', 'discourse', 'ideology' and 'power'. These notions highlight the core focus of CDA, namely the relationship between discourse and other elements of social practice (Fairclough 2003: 205). These terms will be discussed in the sections below.

2.2.1 Discourse

Discourse is defined by Fairclough (2006: 31) as a particular way of representing an aspect or area of social life and social practices. Fairclough (2006: 30) states that "discourse is a moment of social events which is dialectally interconnected with other moments". The "moment" Fairclough (2006: 30) refers to here refers to "texts". Critical discourse analysts regard texts as a variety of ways in which language is used, whether written, spoken, signalled or presented visually (Fairclough 2006: 9). It is used to describe a "linguistic record" (Bloor and Bloor 2007: 7) of any form of meaningful communication that has occurred or is occurring. The genres and contents of texts differ according to the social practice and discourse in which a text is communicated, drawing on various aspects of the (social) world (Fairclough 2003: 127). Since texts are in themselves "products of discourse", their production and consumption are in themselves social practices (Bloor and Bloor 2007: 7). This suggests that, in order to participate in and understand a discourse, both conscious and unconscious social knowledge is needed, as discourses are formed through language use which is, in turn, informed by social ideas or ideologies (Richardson 2007: 23).

Furthermore, discourses represent different physical and emotional aspects of the (social) world; they represent the world as it is, as it could be and as it is not. In addition, they

represent relations among people and their relation to the world which are dependent on, and possibly a result of, their positions in the world and their social and personal identities (Fairclough 2003: 124). Therefore, discourses are utilized as a resource to which people relate and associate with one another, resulting not only in mutual cooperation, but also competition with and domination of one another. Particular discourses therefore dominate or suppress other discourses.

2.2.2 Social practices

Critical approaches view social practices in terms of social relationships and their implications for social concepts such as “status, solidarity [and] the distribution of goods and power” (Gee 2009: 24). These concepts are believed to influence the language used in discourses and the type of social practices related to a particular discourse (Gee 2009: 24). Social life can then be regarded as the result of social practices which are constantly being (re-)produced and transformed through discourse (Machin and Van Leeuwen 2007: 60). A social practice is then “a relatively stabilised form of social activity” (Fairclough 2001: 1) where each practice is regarded as an articulation of social elements that are constructed through discourse (Fairclough 2003: 25). These social elements, namely action and interaction, social relations, persons (with beliefs, attitudes, histories, etc.), the material world and discourses (Fairclough 2003: 25), are thus “dialectically related” (Fairclough 2001: 1). Discourses shape and are shaped by various representations and perspectives of social life through various social actors who present these discourses in different ways. Each social practice then is perceived differently by different social actors, each constructing their own social order of the world around them, thus redefining it accordingly.

Social practices are not only constituted through discourse, but are also legitimised through recontextualisation which reflect various perceptions and are influenced by diverse ideologies that are (re-)instated by society through particular power relations (Fairclough 2001: 2; Machin and Van Leeuwen 2007: 61). This can only be done successfully through language, which is a constituent of what Bloor and Bloor (2007: 24) call “the social”. The social order we construct as a result of discourse is achieved through the combination of genre, discourse and style, which acknowledge how discourses and social practices once were and how they are now, presenting the social change that has occurred throughout history (Fairclough 2001: 2-3; Fairclough 2003: 24). Discourses, through social practices, then become something that can be owned and manipulated and where ideologies are (re-) produced (Fairclough 2003:

24). Thus, ideologies, language use and power relations, or “orders of discourse” (Fairclough 2003: 24), are mediated through social practices and can be perceived as institutionalised “ways of doing” (Fairclough 2003: 24). Fairclough (2006: 30) refers to this as “intermediate social structuring through social practices and discourse.” CDA therefore aims to critically analyse the dialectical relations between discourse and social practices where the possibilities and constraints of discourse are considered an effect of social constructivism.

2.2.3 Power, ideology and discourse

As mentioned above, power and ideology both have an effect on discourse; hence it is necessary for the nature of both of these concepts to be investigated. A prominent task of CDA is to engage with, analyse and critique social power and how it is represented (Richardson 2007: 29). Social practices and discourses produced by individuals, groups and institutions determine the power that they have in society while, at the same time, the power that individuals, groups and institutions have in society determines their social practices and discourses (Richardson 2007: 29-31). This is the reason for particular discourses being regarded as dominant in comparison to other discourses.

Bloor and Bloor (2007: 10) define an “ideology” as a value and belief system that is shared by members of a social group (or institution) which characterises, depends on, and is inevitably influenced by the discourse of that group (or institution). Richardson (2007: 34) elaborates further by stating that an ideology is “not just any system of ideas or beliefs but ways of thinking in which historically transient exploitative forms of social organisation are represented as eternal, natural, inevitable or rational”. Power in discourse and society is related to the particular ideology on behalf of the individual, group and institution that conducts an ideologically-based social practice which constructs ideologies and are, in turn, constructed by ideologies. These beliefs may not be conscious or the discourse may mask a hidden agenda. Hence, the primary task of a CDA analysis is to make these unconscious beliefs or hidden agendas more transparent.

Ideologies affect discourse in that they not only represent social positions in discourse, but can also transform them. Wodak (in Locke 2004: 32) refers to the human being as “a social individual in response to available “representational resources” who subscribes to a particular discourse unconsciously through the process of discourse. Discourses are thus embedded in ideologies since they become naturalised and common sense for individuals. This is because

these individuals view their own perspectives of the (social) world as reality, rather than acknowledging that these perspectives are mere constructions of reality which can change to a lesser or greater extent, or remain constant, and differs from person to person (Locke 2004: 32). These perspectives create a sense of self, construct an individual's identity, and are determined by the individual's position in society. Ideologies reflect society as being characterised by unequal power relations through social conventions that appear to be dominant. These power relations allow for certain conventions to become stabilized and natural, which obscure the effects of power and ideology on society and individuals. Critical theory is therefore applied to discourse analysis, resulting in CDA, in order to create awareness of these power relations that construct and reinforce ideologies which then reflect values of truth (Locke 2004: 33).

CDA is referred to as "critical" because it aims to unmask and critique hidden power relations that are socially and historically situated. Language is perceived as central in the formation of conscious and unconscious subjectivity that represents prominent social power relations and simultaneously suppresses others. The primary aim of a critical analysis of discourse is to take an objective stance towards any phenomena that are to be analysed and to perceive it within a social sphere. This exposes the social conditions that are the consequences of power relations and are formulated by ideologies conducted in the form of discourses within society by various participants of particular social practices. Social norms are then established which assist with the (re-)production of existing social inequalities and perhaps the production of new social inequalities for language use in the form of discourse. This is considered to be the building blocks of how we construct and perceive our realities (Gee 1999: 11-12). Linguistic analysis, combined with social analysis, is essentially what discourse aims to represent. This is because discourse analysis becomes "critical" when analysing language in relation to social context, and the consequences of the language use within a specific context, incorporating different social elements that both inform and form discourse(s) (Richardson 2007: 45). This approach requires a particular discourse to be examined in terms of its textual, discursive and social characteristics as it is a theory which is regarded as interpretative, contextual and constructive (Richardson 2007: 26-27, 115).

2.2.4 Social constructivism

In addition to the core concepts addressed above, CDA adopts a social constructivist approach to reality as a social scientific theory (Tuominen and Savolainen 1997: 81). This approach has no precise definition because a definition asserts precisely that which it aims to reject – that there is one neutral and objective way for it to be defined (Potter 2012: 3). This illustrates the idea that social constructivism is not something that can have just one precise meaning attached to it, but rather that it can have many meanings that are susceptible to change depending on the person (or institution) and context.

According to Potter (2012: 4), social constructivism is a theory that enables social elements (i.e. physical, emotional and mental elements) to be constructed as constantly being influenced by each individual's (physical, emotional and mental) situation, which is (then re-) produced in society. This approach features an interrelated space where various disciplines overlap and interrelate so as to correspond with the various contexts in which it can occur. Although, as previously mentioned, there is no singular way in which to define “social constructivism”, there are three unifying features that are represented within the various disciplines in which it occurs. Firstly, the theory equates an oppositional movement towards traditional social science positions, particularly their assumptions of reality. Secondly, the dependence of the mind and action on cultural forms is paramount. Finally, discourse (theorised in various ways) is considered to be “the central organizing principle of construction” (Potter 2012: 6). Therefore, social constructivism is essentially concerned with the structuring and organising of social realities through communication and the ways in which this communication (or discourse) is constructed in order to represent these realities. Social constructivism thus understands language and knowledge as being a dialogic process that draws on the “constructive nature of language use” (Tuominen and Savolainen 1997: 82) where a negotiation of meaning takes place within a social context (Tuominen and Savolainen 1997: 82). This summarises the main concern of this approach which illuminates the theoretical ideology of CDA, where the ways in which people account for the world in which they live is socially and culturally determined where there is no singular correct or incorrect articulation thereof.

2.3 A critical perspective on media texts and media discourse

CDA is regarded as the leading approach towards discourse analysis of mediated communication (Jones and Holmes 2011: 70). Media discourse is considered one of the most

influential discourse types in contemporary society, despite the fact that since the onset of new technological developments, media texts display vast generic variation and utilise language, culture, and history in various ways (White 1997: 1). As an institution, the media constantly produces and reproduces discourses, hence the academic interest from critical discourse analysts. The media holds great power in the creation, acknowledgment and re-formulation of public debates around culture, politics and economics. Discourse which is mediated through the mass media allows social entities to be (re-)defined, created and depleted.

2.3.1 The power of media institutions

The socio-political agenda of CDA is concerned with revealing unequal power relations that are embedded in society through the (re-)production of discourse. The media as an institution thus plays a central role in CDA because it produces and distributes discourses and is affiliated in almost every sphere of society and human life. This gives media institutions a great deal of power because they control the flow of information through the construction, distribution and execution of information communicated to the public (Jones and Holmes 2011: 135, Richardson 2007: 76). The media can be viewed as meaning-making institutions (Lester 2010: 5) as, in contemporary society, they transform our environments through their (re-)productions of entertainment, news, information and advertising (Kellner 2009: 95), which, in turn, influences the ways in which we shape our ideas and ideologies and how we make sense of the world. This illustrates the power that the media has over society as well as political and governmental institutions. In the case of the latter, their reliance on the media as a driving force for their economic, political and social agendas, enables them to become sites of “marketing, advertising and public relations” (Fourie 2007: xxii; Kellner 2009: 95).

Media institutions do not only empower governments and major institutions; they also empower the public served by governments and other powerful institutions because they enable the formulation and expression of opinions by members of the public (Curran 2002: 7). The power of media institutions has spread and is even greater today as a result of technological advancements, where the public constantly has access to mediated discourses and is constantly engaging with it, thus allowing their constructions of reality to constantly be (re-)produced (Bednarek and Caple 2012: 6; Fourie 2007: xxi). The media frames, shapes and (re-)produces ideologies through various modes and mediums of communication which are portrayed as being transparent and objective (Wodak and Busch 2004: 110). In other words,

media texts use linguistic tools or devices to draw on discourses and ideologies that essentially manipulate the text that is received (Cameron 2001: 132; Johnstone 2008: 54; Sornig 1989: 95-96).

2.3.2 The genre of media texts

It is important to note that the genre of any text restricts the layout and textual structures. The typical structure of a newspaper editorial commences with an introduction to the topic, proceeds with the argument and concludes with a judgement or recalling action (Locke 2004: 69). The headline is usually, but not necessarily, followed by an “opening sentence” (White 1997: 9) known as a “lead” (White 1997: 9). The headline and lead together are referred to as the “textual nucleus” (White 1997: 9) of an article which aims to illuminate the key themes which are presented. This specific genre uses various strategies to establish the authority of the text’s argument (Locke 2004: 69). Since a newspaper article has textual distinctiveness which follows a non-linear structure, cultural and ideological norms are reflected, while a narrative aspect is maintained (White 1997: 1). This suggests that journalists incorporate subjective ideologies through the selection of linguistic (textual) markers whilst maintaining the objectivity that is characteristic to newspaper articles. This removes the objective stance often portrayed by news discourse and personalises the discourse instead (Cameron 2001: 132). It is therefore also important to note that every genre has a sub-genre(s) which further restricts and characterises the text. Examples of major sub-genres pertaining to newspapers would be editorials, opinion pieces and columns (Locke 2004: 69; White 1997: 1).

The genre of any text imposes certain limitations for the writer and expectations on behalf of the reader (du Plooy 2001: 59). Thus, genre operates like a social code established between the author and the reader, creating an interactive element between the two. The generic limitations of a text as well as the value and belief system of the media institution determines the construction of the text and, thus, the meaning making thereof (White 1997: 21-22). Therefore, objectivity and neutrality are reduced in the very process of constructing of a text. In the case of media texts, information is systematically sorted according to a set of norms or categories that are in themselves socially constructed (Richardson 2007: 77). Media texts are then considered to be products of an institution that are produced as “commonsensicle presentations of facts” (White 1997: 25).

2.3.3 Media discourse

The media organises symbols and meanings in ways that construct reality, often in accordance with political ideologies (Lester 2010: 5). This creates and, in the process, reveals hidden power struggles in society. The public gains knowledge of social affairs through media texts which presents various and, at times, conflicting discourses of a particular phenomenon. Media discourses are considered to be “a set of discourses that interact in complex ways” (Gramson and Modigliani 1989: 2). It is this complexity that results in a power struggle for worldly knowledge, which simultaneously reflects and contributes to the (re-) creation of social realities and ideologies (Cameron 2001: 130). Media discourse can therefore be considered as a part of the process of meaning creation in society (Gramson and Modigliani 1989: 2).

A key aspect of media discourse is the use of images, rhetorical devices, layout and organisation of the text and images, as well as the references and quotes used from carefully selected social actors, and the writer as a social actor him-/herself (Durant and Lambrou 2009: 4). The implementation of linguistic devices is considered to be a “linguistic choice” on behalf of the writer, where meaning is generated based on a specific interpretation or ideology (Johnstone 2008: 54) and are thus “instruments of power and deception” (Sornig 1989: 96). In the context of media texts, language use is often selective and misleading but is nevertheless distributed and consumed by society (Burgess 1990: 139). For example, the author’s choice to use the active or passive voice in a text, which allows them to represent social actors in specific ways, is not neutral but is in line with personal or institutional ideologies (Johnstone 2008: 55). The direct and indirect use of quotations plays a crucial role in legitimising claims made by the writer, but can also be used to manipulate what was said by altering it in such a way that the initial meaning behind the voice’s quotation is lost (Johnstone 2008: 61).

In addition, the choice of verbs, adverbs and adjectives affects the presentation and interpretation of the social actors and events. In some cases, journalists choose words to present themselves as confident, intelligent and knowledgeable, in an attempt to persuade the reader to accept their claims as the truth. The ways in which the writer refers to and represents an action, actor, event, issue, idea or emotion constitute a claim about that very item in question (Johnstone 2008: 58). These “naming and wording” (Johnstone 2008: 58) choices suggest, define and construct specific entities in particular ways. The rhetorical

devices, euphemisms and dysphemisms are strategies that represent entities in positive or negative ways (Johnstone 2008: 58-59). The use of pronouns in order to position the writer, actors and characters in particular ways is another example of a rhetorical device that is generally utilised by writers to emphasize their argument. The use of negation and questions, cohesion, organisation of the content, prosody and repetition are all significant in describing and representing the content included (Johnstone 2008: 61).

2.4 Overview of literature on hydraulic fracturing discourses

There is little research that critically investigates discourses on hydraulic fracturing or the public perceptions thereof. Where studies have been conducted, researchers have mostly investigated public perceptions and media constructions of hydraulic fracturing in the American context (Pudlick, Rydzewski and Loncki 2012; Malin 2013). However, the findings of these studies are informative and provide a broad overview of hydraulic fracturing discourses. For this reason, several notable studies will be summarised in the following sections, highlighting the central points that will be drawn on in the analysis chapter to follow. In addition, after a review of the literature, it will become clear that hydraulic fracturing is frequently presented as either an environmental or an economic issue. Thus, these two features will be addressed separately in the following sections.

2.4.1 Hydraulic fracturing discourse representing the natural environment

Given the possible harm that hydraulic fracturing can inflict on the natural environment, media texts on hydraulic fracturing frequently represent and discursively construct the natural environment. Since the environment is both a contentious and emotional issue (Lester 2010), the ways in which it is discursively constructed in media texts has implications for how the text and the central argument is received, as well as how society perceives the natural environment. Given that CDA stems from a social constructivist perspective, and that hydraulic fracturing is often perceived as an environmental issue, the idea that the natural environment is socially constructed is worthy of investigation for this study and will be carried out by analysing a variety of texts.

Social anthropologists like Burgess (1990), Dingler (2013), Lester (2010) and Blommaert and Bulcaen (2000), have frequently purported that the environment is not a “given”, but is constructed in a social and cultural context and receives meaning through discourse. For example, Dingler (2013) argues that the natural environment is constituted through discourses

that are interpretations of social conditions. In addition to this, the natural environment is also argued to be inextricably linked to power dynamics in society (Dingler 2013: 210). As a result, the natural environment becomes a discursive concept that is (re-)created within a social, cultural and historical context, ultimately becoming a socially constructed entity (Dingler 2013: 214). The social construction of the natural environment therefore becomes a product of power, which in itself is a product of politics, controlled by powerful entities like media institutions, governments and MNCs.

Burgess's (1990) investigation of how the mass media produces meanings around the natural environment, which are then uncritically consumed by the public, informs this study. Her research examines how environmental meanings are constructed in the media. She specifically states that the media is an integral part of society and, given this, environmental meanings are inevitably produced and consumed by the public through complex cultural dynamics (Burgess 1990: 139). Burgess (1990) therefore asserts that media discourses are representations of ideologies that are decoded in various ways, depending on a variety of factors available to individuals in a cultural context (Burgess 1990: 139). Reality then is constructed by the media through cultural (social and personal) means in the form of rhetorical devices (including linguistic devices), symbolism and visuals, or a combination thereof (Burgess 1990: 143).

Media representations of the natural environment frequently make use of rhetorical devices and draw on specific cultural forms so as to ensure that the intended meaning, in line with the objectives of the writer and media institution, is understood (Burgess 1990: 140). With concerns over the environment having increased over the past few years, the amount of media representations of environmental issues have also increased. There has also been a notable shift in the way in which the natural environment is interpreted and presented in media texts. Burgess (1990: 141) claims that more contemporary representations of the natural environment suggest a direct affiliation between the natural environment and humankind, and constructs this representation as the "norm"⁴ (Burgess 1990:148). In addition, due to "green consumerist" tendencies, the media frequently incorporates capitalist sentiments and neoliberalist ideologies when representing the natural environment (Burgess 1990: 148). This is largely due to the fact that dominant media discourses are controlled by the criteria of

⁴ This representation contradicts Cartesian or "traditional" representations of the environment, which construct nature and humans as being independents (Dingler 2013: 214).

newsworthiness and relevance to society. However, there are many ways of interpreting the natural environment, and humankind's relationship with the natural environment, most of which are cultural-specific. Thus, Burgess (1990: 148) attempts to highlight the idea of "oppositional readings" of media texts about the natural environment.

2.4.2 Hydraulic fracturing discourses draw on neoliberal logic and discourses

A content analysis conducted by Pudlick et al. (2012) investigated media discourse on hydraulic fracturing in three of the major areas in the Marcellus Shale region in the US, namely Pennsylvania, New York and Ohio. In doing so, the primary public concerns surrounding hydraulic fracturing are highlighted, which include the effects it may have on the economy as well as the lives of the people and animals living near the drilling sites, and the broader, long-term environmental dangers of this mining practice (Pudlick et al. 2012: 4-5). Pudlick et al.'s (2012) research further elaborates on the political agenda which is evident in the discursive representations of hydraulic fracturing in the Marcellus Shale region (Pudlick et al. 2012: 6) and illustrates the power of the media in everyday life (Pudlick et al.'s 2012: 5). Regarding the latter, the authors state that the norms of the American public are (re-) created by powerful media institutions that are given the authority to maintain a specific worldview, while the public are under the impression that they receive all the relevant and correct information which is not restricted, controlled or manipulated in any way (Pudlick et al. 2012: 7).

Pudlick et al. (2012: 6) indicate that organisations (including corporate and governmental organisations) can be legitimised through media attention, thus promoting continuity and financial stability (Pudlick et al. 2012: 6). The role that the media, government and corporations have in influencing public perceptions of hydraulic fracturing is clearly highlighted in this article. In particular, the authors emphasise the perception that having the infrastructure to implement hydraulic fracturing is frequently conceptualised as "an economic asset" (Pudlick et al. 2012: 9) that has the potential to eliminate energy dependence and contribute to "the green economy"⁵ (Pudlick et al. 2012: 10). The economic benefits are represented by the media as "exponential" and "too ample to abandon" (Pudlick et al. 2012: 10-11).

⁵ The notion of a 'green economy' (Pudlick et al. 2012: 10) refers to businesses that conduct their practices and projects in ways that will benefit the environment while generating financial value (Miller and Szekely 1995: 323).

However, the results of Pudlick et al.'s (2012) content analysis reveal two major concerns regarding hydraulic fracturing, namely damage to the environment and local water supplies, and concerns over the amount of water used in the mining process. It also asserted that different news publications framed hydraulic fracturing differently, placing emphasis on different aspects. For example, Pennsylvania media publications focused on ways in which to treat wastewater from hydraulic fracturing, New York publications emphasised the possible threats that hydraulic fracturing poses on the environment, and Ohio publications alluded to the industrial potential of wastewater treatment (Pudlick et al. 2012: 36). In other words, the media texts of each geographical region represented different aspects and perspectives on the hydraulic fracturing process, drawing on different situation contexts, different power dynamics and different ideologies.

Similarly, an article written by Malin (2013) investigates discourses of Pennsylvanian farmers and how they perceive hydraulic fracturing. Her article indicates that the farmers draw on market-based neoliberal rationality⁶ when talking about hydraulic fracturing, but she also states that this way of thinking appears to have become “normalized” (Malin 2013: 7). By conducting extensive interviews and relying on extensive ethnographic data, Malin (2013) was able to show how farmers rely on an economic, cost-benefit model when assessing the damage caused to the environment by hydraulic fracturing. In other words, the farmers appeared content with environmental resources being replaced with economic resources (Malin 2013: 6). Malin (2013) is of the opinion that these farmers resorted to neoliberal logic as a result of their “economic vulnerability” (Malin 2013: 1) and marginalisation as a result of their dependency on natural resources.

Although Malin (2013) is not a linguist or a critical discourse analyst, her work does provide insight into how the public perceives and constructs the hydraulic fracturing process. In particular, Malin's (2013) research draws attention to the idea that hydraulic fracturing is publicly constructed as an economic issue, and that neoliberal logic informs public debate and choices about hydraulic fracturing (Malin 2013: 1). In other words, within contemporary capitalist society, elements of market-based capitalist rationality influence decisions made by government, politicians, the media and the public. In the US, decisions made by farmers,

⁶.Neoliberal rationality constructs “free-market capitalism” (Malin 2013: 3) as superior to “socio-economic systems” (Malin 2013: 3) that instills a sense of individualised economic responsibility. It determines decision-making on behalf of economic outcomes (Malin 2013: 9-10).

corporations and communities have been influenced by this capitalist, market-based logic, resulting in decisions which permit geo-engineering processes for their ability to generate economic wealth⁷. For example, regardless of the environmental impact, hydraulic fracturing is frequently constructed in positive terms as a way to boost the country's economy and generate wealth for both corporations and individuals.

Due to the fact that neoliberal arguments about hydraulic fracturing are shared amongst members within society, Malin (2013: 3, 7) conceptualises these ways of representing as “discourses” about hydraulic fracturing. These discourses in the US have resulted in a “pro-fracking” attitude, based on an economic logic that appeals to many people due to its promise of individual wealth and profit. Malin (2013) further indicates how market-based metaphors and discourses have become increasingly central in environmental and agricultural contexts. These market-based metaphors are most evident in the discourses of privatisation and commodification, which permits natural resources to be owned by private firms and state institutions and then regulated and traded in a market system (Malin 2013: 3). Not only does this denote a shift away from environmentalist arguments about the natural environment⁸ but it also reflects the increasing power and control of policymakers, corporations and governments over the public, contributing to an increase in poverty and inequality (Malin 2013: 3). Furthermore, by adopting economic logic and discourses about hydraulic fracturing, the media is able to manipulate information and present it in a specific way so as to influence and even change the audience's opinion and understanding of hydraulic fracturing. These discourses therefore have major implications for power relations between individuals, corporations, politicians and government, especially since those individuals who oppose hydraulic fracturing are perceived as irrational by those who have accepted hydraulic fracturing because of its proposed economic benefits (Malin 2013: 9).

Malin's (2013) findings have major implications for this study, since hydraulic fracturing in the Karoo is frequently constructed and perceived as an economic issue and as a means to increase employment (de Wit 2011: 6, Fig 2012: 25, 28, Malin 2013: 6, Pudlick et al. 2012: 4

⁷ According to Schumpeter (1934: 1), “[t]he development of capitalist society allowed all things to be valued within a monetary system for capitalism inherently depends upon economic progress, development, innovation, and expansive activity, which would be suppressed by inflexible monetary policy”.

⁸ An environmentalist argument would construct the natural environment as worthy of being valued and protected for its own sake. This will be further addressed in section 4.6.

and 22, Stephenson, Doukas and Shaw 2012: 453). However, Fig (2012: 28) claims that leasing land for hydraulic fracturing, and the hydraulic fracturing process in general, may compromise the livelihoods of many farmers and communities, resulting in further unemployment and the need for financial support from capitalist corporations. Additionally, the exploration phase of hydraulic fracturing could last up to nine years in which limited employment opportunities may be available. This is because running these wells would require a small number of “very skilled operatives” (Fig 2012: 28), most of whom would not be South African. Research from the US further stresses the lack of employment opportunities, indicating that over 400 wells can be managed by only 66 employees (Fig 2012: 28). Thus, according to Fig (2012: 28) the economic and employment aspect of the pro-fracking debate is underdeveloped and does not appear to be a central concern for the state and the media in South Africa.

According to Malin (2013: 5-6) economic discourses about hydraulic fracturing are powerful discourses because they appeal to locals who may feel as if they no longer need to be concerned about losing their farms, incomes and/or resources. Instead, they gain economic benefits for themselves, the community and the corporations involved (Malin 2013: 5-6). However, this sense of economic security may heighten existing power and fiscal inequalities, permitting only government and corporate institutions to generate profit from this process. Malin (2013: 2) further warns that environmental degradation and persistent poverty could then be regarded as the norm, or an unavoidable result of economic (and employment) development, leaving the main concerns and resulting discourses regarding hydraulic fracturing to water contamination and shortages, and not to the capitalist system as a whole.

Apart from the employment benefits, hydraulic fracturing has also been constructed and perceived as beneficial because shale gas is viewed as a transition fuel or alternative energy source (Fig 2012: 30; Stephenson et al. 2012: 454; Vermeulen 2012: 155). Not only are transition fuels considered more environmentally friendly or “cleaner” than carbon (Stephenson et al. 2012: 452), they are often more cost-effective in that, for example, shale gas is “more climate-friendly than coal” (Fig 2012: 24-25) and would contribute to reducing carbon emissions. Others claim that the process of hydraulic fracturing is “dirtier than coal energy” (Pudlick et al. 2012: 10). The media frequently draws on knowledge and perceptions about alternative fuels when representing hydraulic fracturing. Madsen, Have, Woodrow and

Olsen (2012) investigated the debate around hydraulic fracturing in Denmark and compared the shale gas debate to the nuclear power debate from the 1970s and 1980s. This comparison was made to highlight the lack of public involvement in decision and policymaking, leaving the media as the most prominent participant (Madsen et al. 2012: 1). Madsen et al. (2012: 3) state that the neoliberal discourse of hydraulic fracturing undeniably presents a “greener perspective” of fossil fuels where a “low carbon economy” (Fig 2012: 31) could be established which would assist in economic development as well as achieving energy targets. Hydraulic fracturing is often constructed in the South African context as a means of reaching the country's climate change targets as well as making the country self-sufficient in terms of energy consumption and production (Fig 2012: 25; Stephenson et al. 2012: 454; Vermeulen 2012: 155).

Madsen et al. (2012: 1) point out that there is a lack of research on the impact of hydraulic fracturing in Denmark, causing writers to draw on American examples and evidence. They also make reference to discourses on hydraulic fracturing being subjected to polarisation, where environmental and neoliberal discourses are constructed as oppositional, each making use of particular ideas and beliefs through language in order to present their debate (or discourse) on the impacts, risks, benefits and downfalls of hydraulic fracturing (Madsen et al. 2012: 1-2). With this construction of polarisation in mind, the central argument appears to focus on the risks and uncertainties (Madsen et al. 2012: 2; Stephenson et al. 2012: 452; de Wit 2011). This depicts the controversy of hydraulic fracturing discourse, and the fact that not enough research has been undertaken to justify and provide solid evidence of the effects of the process, specifically within the South African context.

2.5 Conclusion

This chapter had two primary objectives: first, it presented an overview of the theoretical concerns of CDA in an effort to clarify the theoretical understandings of this study. In doing so, core concepts were highlighted which will be used to understand and interpret the data in chapter four. Second, this chapter presented an overview of contemporary, cross-disciplinary research that is related to this study. The primary aim of this is to draw correlations between these findings and other studies of a similar nature. This will be addressed further in chapters four and five.

Chapter 3: Methodology

3.1 Introduction

In this chapter, the methodological processes involved in the data collection for this study will be expanded upon. As previously mentioned, a CDA approach was adopted for this study in order to analyse media texts, which were published from the beginning of 2011 to the end of 2012, that investigate hydraulic fracturing in South Africa. In particular, the study aimed to investigate the ways in which hydraulic fracturing, conceptualised as a social practice, is discursively represented in different South African media publications. Keeping in line with the primary aims of CDA, this study also aimed to uncover hidden ideologies in the selected media texts and to determine which discourses are dominant in media representations of hydraulic fracturing. For the purposes of clarity and coherence, the research question and hypothesis are repeated in sections 3.1 and 3.2 respectively, after which further explanations will be provided as to how the data were collected for this study.

3.2 Research questions

This study aims to answer the following research questions:

- (i) How do media texts, from a variety of media publications, represent the social practice of hydraulic fracturing?
- (ii) What ideologies are evident, in and dominate these representations?

3.3 Hypothesis

The hypothesis of this study is that various media publications represent various ideologies and perspectives of hydraulic fracturing. Depending on the media publication, various media texts will predominantly present either an economic or an environmentalist perspective on this process.

3.4 Qualitative research

This study is a qualitative study in which newspaper articles were purposely selected in order to investigate and aid in answering the research question. As such, it is important to give a very brief description of what qualitative research entails.

Qualitative research is an approach to data collection and analysis that takes a postmodernist approach to investigating society which considers the ‘truth’ to be mediated by ideology (Holliday 2010: 98-99). As a result, it is highly subjective and adopts a “naturalistic, interpretive approach” (Snape and Spencer 2003: 3) to understanding social behaviour. Due to the diversity of disciplines and discourses in which qualitative research is done, a single, all-encompassing definition is not possible (Flick 2007: 2; Holliday 2010: 98). However, Flick (2007: 2) furnishes the following general understanding of the concept of ‘qualitative research’, based on research by Denzin and Lincoln (2005a: 3):

“Qualitative research is a situated activity that locates the observer in the world. It consists of a set of interpretive, material practices that make the world visible [...], transform the world [...] into a series of representations [...] and [...] involves an interpretive, naturalistic approach to the world. This means that qualitative researchers study [...] natural settings, attempting to make sense of, or interpret, phenomena in terms of the meanings people bring to them.”

The ways in which the empirical research then is carried out depends upon various factors which impact the aim of the research, such as the ontological (philosophical beliefs about the social world), epistemological (philosophical beliefs of knowledge), contextual situation and theoretical and methodological approach of the researcher (Flick 2007: x; Holliday 2010: 98). These factors influence the ways in which any social behaviour is interpreted within any context, illustrating power structures, cultural norms and modes of organisation. Essentially, the aim of qualitative analysis is to illuminate social conditions, ideologies, understandings and behaviours. Particular theories from various disciplines are required to describe and explain social issues that can be (re-)constructed and analysed through different qualitative methods⁹ that allow for generalisations to be made from the collected empirical material (Flick 2007: x). These generalisations act as insights for scientific and social purposes, but also produce relevant knowledge as possible solutions to practical problems (Flick 2007: 6).

Even though qualitative research is “inevitably [...] subjective” (Holliday 2010: 98), researchers need to establish and maintain a neutral and objective stance towards the data in order to present the research as valid and trustworthy. This objectivity vanishes with qualitative evaluation which propagates judgments, results and conclusions that can only be determined through interpretations of the data, further illustrating the subjectivity of

⁹ Gee’s (1996) CDA framework will be discussed in section 3.6.

qualitative research. These evaluations, however, can present limitations for some results due to time frames, routines of practice and institutional settings that may require adaptations to particular procedures (Flick 2007: 6). The validity and trustworthiness of the research, depending upon the management of subjectivity by the researcher, also illustrates limitations of qualitative research as results vary from one researcher to another based on their data collection procedure and on the researcher him-/herself (Holliday 2010: 102).

CDA is one of many kinds of analytic approaches that can be categorised as largely “qualitative” concerned with the linguistic aspects of communication as well as the social, cultural, anthropological and ethnographical associations of qualitative research that assist in the construction of (the meanings attached to) social phenomena and, more broadly, the world (Holliday 2010: 99). It is important to note that the purpose of qualitative research is not to prove a hypothesis, but rather, to generate ideas in order to think critically and question social phenomena (Holliday 2010: 101-102).

3.5 Selection of texts

The data used in order to conduct this study were located on the South African Media (SA Media) database, an online database available on the University of Stellenbosch’s library website (www.sun.ac.za/library).

3.5.1 South African media

At Stellenbosch University, SA Media is a database that is accessed via Sabinet, an online electronic information service provider, which is partnered with OCLC Inc., a global membership computer library service and research organisation. This online library was established in 1983 and offers a wide range of library services and products ranging from library management systems, electronic publications, content management services, digitisation services and legal products and services. It includes cataloguing, interlending and reference services that are utilised by academic, public, government and corporate libraries within South Africa and across the African continent. Sabinet is also an aggregator of Southern African electronic publications, and boasts a collection of more than 300 journals (various subject collections and Open Access journals) that are widely used by both local and international organisations (Sabinet 2013).

The SA Media database offers access to more than 3 million newspaper reports and periodicals. The available press cuttings are skilfully selected and analysed in order to be made available online for public consumption. The database includes press reports that can be categorised under specific social topics such as politics, economics, social, labour and cultural. It enables a categorised search function of topics, publications, dates and keywords of newspaper reports. This ensures informed decision-making based on accurate and organised research that saves time (SA Media 2013).

3.5.2 Newspaper publications

In order to gain an in-depth understanding of the topic under investigation, media texts were selected from both national and regional South African newspapers. The specific newspaper publications were selected on the basis of their wide readership. Smaller publications were excluded in order to limit reporting that would present a more biased discourse on hydraulic fracturing, therefore eliminating any objectivity taken by newspaper publications and their journalists and presenting a more comprehensive insight to the hydraulic fracturing discourse in South Africa.

South Africa runs a free press where 22 daily and 25 weekly urban newspapers are published through many (independent) media houses. The four newspapers selected for this study as a result of their wide readership are the Cape Argus, The Star, Mail & Guardian and Sunday Times. The Cape Argus and The Star are regional (published in the Western Cape and Gauteng respectively) newspapers which are published daily, both are owned and published by the Independent Newspaper Group. The Mail & Guardian and the Sunday Times are national newspapers which appear weekly. The Sunday Times is owned and published by the Times Media Group whereas the Mail & Guardian is owned and published by Mail & Guardian Media, an independent media house. These newspapers steer away from the “tabloidisation” of South Africa’s newspaper industry (MediaClub South Africa 2013).

The Cape Argus is aimed at middle- to upper-income readers of all races in and around Cape Town. Chris Whitfield is the editor of this English-language newspaper and it boasts a readership of 349 000 readers and a circulation figure of 63 200 (MediaClub South Africa 2013).

The Star was initially launched in Grahamstown in the Eastern Cape in 1887 but moved to Johannesburg. Today, it is largely published in English throughout Gauteng and is distributed throughout South Africa. The publication is aimed at all races. Moegsien Williams is the editor of the newspaper which claims a readership of 547 000 readers and a circulation figure of 143 080 (MediaClub South Africa 2013).

The only newspaper owned by its own media group is the Mail & Guardian, formerly known as the "Weekly Mail". This publication was established at the height of resistance to apartheid in 1985, along with a few others that subsequently closed down due to a lack of funding from foreign investors. The Weekly Mail, however, remained strong through a partnership with The Guardian of London. Today, only a 10% stake is owned by The Guardian with the majority of the shares belonging to Newtrust Company Botswana Limited, owned by the Zimbabwean entrepreneur Trevor Ncube. The Mail & Guardian is a national newspaper with Nic Dawes as the editor. It has a readership of 428 000 and a circulation figure of 50 230 (MediaClub South Africa 2013).

The Sunday Times newspaper is South Africa's second largest national newspaper with the highest readership of 3,8 million and a circulation figure of 462 370. Ray Hartley is the editor and the publication is owned by Avusa, more commonly known as the Times Media Group. The Sunday Times was established in 1906 and, today, is distributed across South African as well as in neighbouring countries such as Lesotho, Botswana and Swaziland (MediaClub South Africa 2013).

3.4.3 Selection process

While researching data, it became apparent that hydraulic fracturing was a more prevalent topic in media discourse in 2011 compared to any other predating year. Hence, articles on hydraulic fracturing were specifically selected from the specified publications from within the time period of the beginning of 2011 to the end of 2012. Post-2011, it was evident that companies no longer sought to apply for licences and rights in order to conduct the hydraulic fracturing process. This changed with the placement of a moratorium in 2011, which was extended twice until it was eventually lifted in September 2012. The discourse began to present propositions, facts and previous research, exploration and results that have taken place globally, especially in the US. The media discourse then attempted to present the negotiation process that took place as a result of the moratorium and the establishment of a

governmental task team. This attempted to present the potentially harmful impacts that hydraulic fracturing may pose on the natural environment with a counter-argument elaborating on the economic and social benefits through previous research from other countries, their results and applications and predictions for the South African context. The discourse thus not only presents a space for negotiation, but also a space for debate to try and persuade authoritative figures and convince the public about previous cases where hydraulic fracturing has occurred that have either been very successful, both for the economy and the environment, or as failures, where economic, social and environmental assumptions were not followed through.

The year 2012 was marked by less speculative discourses of the positive and negative possibilities of hydraulic fracturing. The discourse focused more on the idea of exploration rights that required more research regarding the South African context. Shell's presence throughout this study's two year scope is significant here as Shell is one of the few companies that applied for hydraulic fracturing licences and received exploration rights when the moratorium was lifted in 2012. This is significant due to the fact that Shell is an extractive oil company with great power, a long history, and is one of the most successful multi-national corporations in modern society.

The process of data collection for this study not only included four select publications and a specific time frame, but also included a keyword search and a selection of particular topics provided by the SA Media database. These key search terms narrowed the data research and collection in order to present hydraulic fracturing within the South African context under the relevant topics that hydraulic fracturing infiltrates. These key search terms included *hydraulic fracturing*, *fracking*, *shale gas*, *exploration*, *Karoo*, and *Shell*, under the topics of Industry and Mining; Environmental Affairs; Economic Affairs, Trade, Industry and Mining; Agriculture, and Water and Environmental Affairs.

The filtration of articles from SA Media provided a large corpus of texts of which 32 articles will be used as illustrations of media texts discourses in South Africa in order to present broad generalisations as a part of this study's analysis. In addition, a random selection of four texts - two from 2011 and two from 2012, each from a different publication - will be closely analysed.

In order to answer the research question, Gee's (1996) model of CDA is taken as a model and used as a critical method of enquiry in the analysis of the four closely read texts.

3.6 Gee's framework

As previously mentioned, Gee's (1996) model of CDA interprets five interrelated linguistic systems, namely prosody, cohesion, organisation of discourse, contextualisation signals and thematic organisation (Locke 2004: 58). Each of these five linguistic systems inter-relate on at least one level, thus each system should be considered with regards to the other four. As with every CDA framework, Locke (2004: 58) points out the analytical framework of Gee (1996) is, "an act of interpretation and therefore subject to contestation and critique". Gee (2009: 23) points out that CDA treats social practices in terms of social relationships and the "implications of status, solidarity, distribution of social goods and power". This definition may also be applied to that of politics, which is also associated with society and social practices. With these implications being involved in (the definition of) politics, the fracking debate will continue, with the one debate overpowering the other until a common ground is found (Gee 2009: 23-24).

3.6.1 Gee's method of CDA

Gee's (1996) method of CDA encapsulates the idea that CDA is both a theory and a method by which the purpose of texts can be understood and critically analysed. His method highlights the previously mentioned five different, yet inter-related, linguistic categories by which texts can be critically analysed. These categories are considered within a sociolinguistic context acknowledging social theory as a fundamental aspect of understanding and critically analysing any text. They are briefly outlined below.

3.6.1.1 Prosody

Prosody is an element of spoken discourse, but the term is also used to name practices of highlighting important aspects or placing emphasis on elements which the writer considers important. These elements are highlighted through grammatical pauses, referred to as "pregnant pauses" (Locke 2004: 58). Other grammatical tools such as hyphens, the particular use of a comma which emphasises pregnant pauses, and the use of cohesive strategies to be discussed below, are incorporated to emphasise particulars.

3.6.1.2 Cohesion

Cohesive features work in much the same way as prosody in that they use cohesive devices such as conjunctions and lists. The writer can structure the discourse in a way that places emphasis on certain themes or concepts at the expense of others. Locke (2004: 60) describes cohesion to be the linguistic element which holds a text together, thus creating a meaningful whole.

3.6.1.3 Conjunctions

Conjunctions are used to establish relationships of either co-ordination or subordination (Locke 2004: 61); the former suggesting parallelism and the latter suggesting cause-and-effect relationships. The use of “and” suggests similarity in the sentences or phrases it is connecting, thus concealing a cause-and-effect relationship (Locke 2004: 61).

3.6.1.4 Contextualisation signals

The context of a text is hardly ever explicitly stated, but is rather constructed in the text through various discursive strategies (Locke 2004: 59). In other words, discourses construct participants that are associated with a particular social practice. In the context of newspaper articles, the writer is required to remain objective. However, through the use of language and the application of narrative (White 1997) for the writer to merely "tell the story", he/she incorporates subjectivity and thus does not remain completely objective.

3.6.1.5 Discourse organisation

Locke (2004: 64) describes discourse organisation as the way in which the text as a whole is structured. The rhetorical strategies employed in these discourses rely heavily on statement or assertion (Locke 2004: 64- 65).

3.6.1.6 Thematic organisation

Thematic organisation involves the themes that are prevalent in the discourse. This linguistic tool is closely related to contextualisation signals and discourse organisation as the themes which are discussed and the way in which they are organised are highly dependent on the textual organisation, which is distinctive of the genre in which the information is disclosed.

3.7 Conclusion

The main objective of this chapter was to present an overview of the methodological approach that was adopted in this study. This included an overview of the research questions and aims, an overview of the nature of qualitative research, an indication of how the media texts were selected for this study, and a presentation of Gee's (1996) method of CDA which will be used to analyse and interpret the data in chapter four.

Chapter 4: Data Analysis

4.1 Introduction

The following chapter presents a critical and interpretative analysis in the form of CDA of the newspaper articles identified in Chapter Three. Given that hydraulic fracturing is conceptualised in this study as a social practice, and that the aim of a CDA analysis is to investigate the ways in which discourses construct, legitimise and maintain social practices (Fairclough 2001: 2; Machin and Van Leeuwen 2007: 61), the aim of this chapter is to investigate the ways in which hydraulic fracturing is discursively constructed in South African media texts. The chapter begins with an overview of the 32 selected media texts; that is, a summary is given of the shared structure of the media texts as well as the shared discursive strategies used to broadly represent the social practice of hydraulic fracturing. This section aims to show the reader what core themes and common representations occur in all 32 texts. This will become more transparent in a close analysis of the four articles identified in chapter three. The second part of this chapter draws on Gee's (1996) model of CDA to conduct a close analysis of the four chosen media texts, and will be used to show how five levels of the text (prosody, discourse organisation, cohesion, thematic structure and contextualisation signals) work together to create a particular representation of hydraulic fracturing.

4.2 The genre of media texts

The texts under investigation are all newspaper articles and thus share many generic features, which influence the reader's interpretation (White 1997: 21-22). All newspaper articles contain similar features, for example, a headline and paragraphs which link together to form the argument of the text. In addition, newspaper articles share the language features that were mentioned in section 2.3.2. From a CDA perspective, newspaper texts spread ideologies while spreading information (Durant and Lambrou 2009: 4). These ideologies are constructed through the use of linguistic and rhetorical devices, which include repetition (including alliteration and assonance), metaphors, puns, hyperbole, intertextuality and idiomatic expressions (Johnstone 2008: 54).

A review of the 32 articles under investigation indicates that the authors rely on common rhetorical devices to represent the content in the headlines¹⁰. The most common rhetorical devices used in the headlines are assonance and alliteration. For example: “It’s fracking profitable, but fraught with danger” (Ho 2011a: 13), “Farmers say ‘no fracking way’ to Shell” (Macleod 2011a: 14) and “Fracked if you do, fracked if you don’t” (Donnelly 2011a: 4). The examples illustrate repetition of both the “f” and “æ” phonetic sounds. Not only are alliteration and assonance used as rhetorical devices to grab the reader’s attention, they are also useful to direct attention to, thus emphasize, particular words or concepts. In the examples above, the repetition of sounds helps to pair the concept of ‘fracking’ with the concept of danger (Ho 2011a). Alliteration also helps to pair the concept of ‘fracking’ with the concerns of farmers (Macleod 2011a), and it helps to allude to the complexities around the hydraulic fracturing debate (Donnelly 2011a: 4). Alliteration and assonance are also evident in the following heading: “Fracking blamed for poverty not profit” (Louw 2012: 20). Here the repetition of the “v” and “i” phonetic sounds, in addition to the “p” phonetic sound, makes this heading effective. It draws on contrasts between “profit” and “poverty”, drawing attention to key themes within the text, of which several are repeated in many of the news articles under investigation.

In addition, all the headlines mentioned above rely on intertextuality and allude to common idiomatic expressions to create a link between the term “fracking” and the term “fucking”. Since swear words seldom occur in media texts, allusion to the term “fucking” in the headline assists in grabbing the reader’s attention. According to Jay and Janschewitz (2008: 267), the primary purpose of swearing is to express emotions, particularly anger and frustration. In addition, Dewaele (2004: 205) states that:

“swearwords are multifunctional, pragmatic units which assume, in addition to the expression of emotional attitudes, various discourse functions. They contribute, for instance, to the coordination of the interlocutors, the organisation of the interaction and the structuring of verbal exchange, in that they are similar to discourse markers (Drescher, 2000). The use of (swearwords) is also a linguistic device used to affirm in-group membership and establish boundaries and social norms for language use”.

Dewaele’s (2004) argument not only emphasizes that the allusion to “fucking” carries emotional appeal, but it also may have the rhetorical function of achieving solidarity amongst

¹⁰ See Appendix A for the headlines of the 32 articles.

the target readership and affirming in-group membership. This makes it easier for the readers to accept the claims made by the writer.

Metaphor has been a linguistic tool for writers and poets for centuries in order to express themselves creatively, especially regarding abstract phenomena such as emotions (Lakoff and Johnson 1981: 287). This rhetorical device is also commonly used in the headlines of newspaper articles, including the ones under investigation, for example, “Public kept in the dark regarding progress of fracking team” (Yeld 2011b: 4), “First blood to pro-frackers” (Mashego 2011a: 4), and “Fracking gets green light” (Vollgraaff 2012: 1). These all exemplify the metaphorical use of language which is most generally understood to be the process of understanding something in terms of something else (Taverniers 2006: 1-2). Lakoff and Johnson (1981: 286-287) deduce that metaphor is not only a tool used in literary works, but is used every day by human beings in order to understand and perceive the world. This form of metaphor is known as a conceptual metaphor and is considered to be pervasive in everyday life in the sense that we almost always conceptualise both abstract and tangible things in terms of something else (Steen 1994: 6-7).

In the examples above, hydraulic fracturing is conceptualised as a secret, as part of a violent game, and as a vehicle on the road. These metaphors use concrete concepts to describe an issue which is contested and disputed, and helps readers to conceptualise the situation. Since conceptual metaphors influence our day-to-day perceptions on an unconscious level (Lakoff and Johnson 1981: 287), the conceptual metaphors of the headlines may determine the readers’ conceptualisations of hydraulic fracturing in both positive and negative ways.

In addition to headlines, the newspaper articles are generally followed by the author’s name and a number of paragraphs that support the proposition put forth in the headline. These paragraphs elaborate on the headline and also work to summarize and foreground the argument of the text. The articles all share certain characteristics pertaining to the structure of the text (headline, paragraphs etc.) and also the manner in which the texts are written. Almost all the articles contain rhetorical devices such as repetition, cohesion, prosody, listing and quoting. The most commonly quoted voices of the news articles are: Jonathan Deal, the chairman of the Treasure the Karoo Action Group (TKAG) (Biyase 2011: 9; Buirski 2012: 9; Ho 2011a: 13; Ho 2011b: 25; Jordan 2012: 3; Nel 2012: 15; Nkabinde 2012: 13; Vollgraaff 2012: 1; Pressly 2011b: 5; Yels 2011d: 8); Susan Shabangu, the Minister of the Department

of Mineral Resources (Biyase 2011: 9; Donnelly 2012: 16; Fig 2012: 36; Jordan 2012: 3; Pressly 2011a: 17; Pressly 2011b: 5; Pressly 2012b: 8; Pressly 2012c: 15; Yeld 2012a: 6; Yeld 2011a: 8; Vollgraaff 2012: 1); Trevor Manuel, the South African Minister in the Presidency (National Planning Commission) (Pressly 2012a: 23; Pressly 2012c: 15; Ho 2011b: 25; Vollgraaff 2012: 1); Dr Chris Hartnady, geologist and Research and Technical Director of Umvoto Africa (Mashego 2011a: 4; Nkabinde 2012: 13; Steyn 2011: 15); Bonang Monale, the Chairman and Vice President of Shell South Africa Energy Limited (Nkzbinde 2012: 13; Jordan 2012: 3; Williams 2011: 15; Yeld 2011d: 8), and Dr Danie Vermeulen, the Director of the Institute for Groundwater Studies at the University of the Free State (Ho 2011b: 25; Mashego 2011b: 13; Yeld 2012a: 6). As leading politicians, academics, business men and government officials operating within powerful institutional settings, these individuals have a considerable amount of influence to control discourses and perceptions of hydraulic fracturing. Furthermore, news writers usually quote these individuals to support or refute ideas about hydraulic fracturing and the choice to include direct or indirect quotations is therefore considered a rhetorical strategy and contextualisation signal (Locke 2004: 59) on behalf of the writer.

The subject matter of the articles is organised in such a way as to single out the core elements of the issue (or event) in a way which compels the reader to engage with the text. This is accomplished through rhetorical and discursive devices which intensify the argument, repeat core themes and devices which then construct the writer in ways so that the reader accepts their perception as “the truth”. Various verbs used to introduce statements of fact by the writers assist in presenting themselves as “truth-sayers” (Locke 2004: 60), intending to reveal facts in order to inform the public. The authors often use terms such as: “noted/s” (Eggink 2012: 17; Pressly 2012a: 23; Pressly 2012b: 15; Pressly 2012c: 8; Steyn 2011: 15); “reveal” (Donnelly 2011: 4; Jordan 2012: 3; Macleod 2011a: 14, Yeld 2012: 6); “confirmed” (Biyase 2011: 9; Jordan 2012: 3; Pressly 2012b: 15; Vermeulen 2013: 13); “claim” or “claimed” (Donnelly 2012: 16; Pressly 2011: 17; Steyn 2011: 15); “described” or “describing” (Macleod 2011a: 14; Steyn 2011: 15; Yeld 2011c: 3); “reported” or “reports” (Louw 2012: 20; Macleod 2011a: 14), and “according to” (Eggink 2011a: 14; Pressly 2012b : 15; Pressly 2012c: 8; Yeld 2012: 6). These examples assert that the writers are knowledgeable and reinstate a form of authority over the reader (Johnstone 2008: 55-61; Locke 2004: 69).

4.3 Shared discursive constructions of the practice of hydraulic fracturing

As articulated in earlier chapters, this study conceptualises hydraulic fracturing as a social practice with an affiliated discourse or discourses, which represent this social practice (Fairclough 2003: 205). In addition, media texts are conceptualised as representing public discourses about hydraulic fracturing, as well as representing the elements of those social practices (for example, the participants involved and the context in which it occurs). When representing hydraulic fracturing, many of the news articles make reference to the contested nature of the topic and frequently construct the conversation around hydraulic fracturing as a “debate” (Bayise 2011: 9; Donnelly 2011: 4; Eggink 2011a: 14, Eggink 2012: 17; Fig 2012: 36; Mashego 2011a: 4; Mashego 2011b: 13; Nel 2012: 15; Pressly 2012b: 8, Pressly 2012c: 15; Prinsloo 2012: 13; Steyn 2011: 15), often adding adjectives such as “heated” (Pressly 2012a: 23) or “great” (Mashego 2011a: 4, Eggink 2011a: 14). Representing hydraulic fracturing as a “debate” or contentious issue highlights the differences in ideological perspectives as far as this issue is concerned. Furthermore, frequent description of this “debate” as “heated” or “great” emphasises the emotive, cultural, historical and social influences that establish, and are central to, this opinionated discussion.

In addition, the process of hydraulic fracturing is defined and referred to differently, and writers choose one or more of the following words or phrases to refer to the process: “hydraulic fracturing” and “fracking” (Donnelly 2012: 16; Fig 2012: 36; Ho 2011a: 12; Mashego 2011a: 4; Mashego 2011b: 19; Macleod 2011a: 14; Nkabinde 2012: 13; Nel 2012: 15; Pressly 2011a: 17; Pressly 2011b: 5; Pressly 2012a: 23; Pugh 2012: 28; Steyn 2011: 15; Williams 2011: 15; Yeld 2011a: 8; Yeld 2012: 6), “shale gas exploration” (Donnelly 2012: 16; Pressly 2011a: 17; Pressly 2012a: 23; Vermeulen 2012: 13; Vollgraaff 2012: 1); “exploration” (Biyase 2011: 9; Donnelly 2011: 4; Donnelly 2012: 16; Eggink 2011a: 14; Eggink 2011b: 18; Eggink 2012a: 17; Fig 2012: 36; Ho 2011b: 25; Macleod 2011a: 14; Pressly 2011b: 5; Pressly 2012a: 23; Pressly 2012c: 15; Steyn 2011: 15; Yeld 2011a: 8; Yeld 2011b: 4; Yeld 2011c: 3; Yeld 2011d: 8; Vermeulen 2012: 13; Vollgraaff 2012: 1), “development” (Eggink 2012a: 17; Williams 2011: 15; Vollgraaff 2012: 1); “shale gas development” (Donnelly 2011: 4; Nkabinde 2012: 13); “drilling” (Eggink 2011a: 14; Eggink 2011b: 18; Fig 2012: 36; Louw 2012: 20; Macleod 2011a: 14; Pressly 2012b: 8; Steyn 2011: 5; Vollgraaff 2012: 1); “production” (Fig 2012: 36; Nkabinde 2012: 13), and/or “operations” (Eggink 2011a: 14; Eggink 2012a: 17; Pressly 2012a: 23). In many cases the use of

technology in the hydraulic fracturing process is referenced (Donnelly 2012: 16; Eggink 2011b: 18; Pressly 2011a: 17; Pressly 2012a: 23; Prinsloo 2012: 13; Nel 2012: 15; Yeld 2011b: 4), as well as the use of chemicals (Donnelly 2011: 4; Fig 2012: 36; Ho 2011a: 13; Macleod 2011a: 14; Pressly 2011a: 17; Pressly 2012a: 23; Pressly 2012c: 8, Vollgraaf 2012: 1), and how these chemicals could contaminate the surrounding environment (See, for example, Ho 2011a: 13 and Pressly 2011a: 17 who repeats the word “contaminate” four times and Macleod 2011a: 14 who repeats it six times).

In some cases, hydraulic fracturing is constructed as a negative, harmful and “unregulated and invasive” (Macleod 2011a: 14) mining practice with much “controversy” and emotion attached to it (Donnelly 2011: 4; Macleod 2011a: 14; Prinsloo 2012: 13; Pressly 2012b: 15; Vermeulen 2012: 13; Yeld 2011a: 8; Yeld 2011b: 4; Yeld 2011c: 3). The mining practice is also constructed as risky (Fig 2012: 36; Steyn 2011: 15), a process that requires a large amount of water (Fig 2012: 36; Ho 2011a: 13; Ho 2011b: 25; Macleod 2011a: 14; Pressly 2011a: 17; Prinsloo 2-12: 13; Pugh 2012: 28; Vermeulen 2012: 13) which poses a threat to the environment and, consequently, to society. In some cases the concerns about hydraulic fracturing are constructed as “serious” (Yeld 2012a: 6) and “great” (Yeld 2011a: 8) while in other cases hydraulic fracturing is framed as a positive and beneficial practice, a “golden opportunity” (Donnelly 2011: 4) to reduce South Africa’s carbon footprint (Donnelly 2011: 4; Eggink 2011b: 18; Eggink 2012a: 17; Mashego 2011a: 4; Pressly 2012a: 23, Steyn 2011: 15). Some of the articles positively construct hydraulic fracturing by making reference to neoliberalist terminology that evokes hope in the people of South Africa and possible development for the South African economy. Such examples include mentioning the “low carbon economy” (Pressly 2012a: 23; Williams 2011: 15), the potential to “break Eskom’s monopoly” (Mashego 2011a: 4; Steyn 2011: 15) and speak of the “golden age of gas extraction” (Pressly 2012c: 8). Where neoliberalist ideologies prevail, the texts almost always present hydraulic fracturing as not harmful to the environment and as an “environmentally sensitive” process (Eggink 2011b: 18; Eggink 2012: 17, and Pressly 2012a: 23).

Where hydraulic fracturing is presented as a positive practice, efforts to locate and extract shale gas are often metaphorically constructed as an “exploration”, where Shell is constructed as an imaginative and adventurous explorer and voyager, eager to conquer new land in an effort to contribute to human development. This presents hydraulic fracturing as something that may lead to development and economic, social and technological advancement. Table 1

presents the number of lexical entries in the various articles from 2011 and 2012 in which the writers refer to hydraulic fracturing as an “exploration” or opportunity to “explore”.

Table 1. Number of lexical entries for hydraulic fracturing viewed as an “exploration” or opportunity to “explore”.

2011 texts	Number of entries	2012 texts	Number of entries
Pressly 2011a: 17	2	Pressly 2012a: 23	3
Pressly 2011b: 5	6	Pressly 2012b: 8	1
Biyase 2011: 9	3	Pressly 2012c: 15	4
Eggink 2011a: 14	4	Vermeulen 2012: 13	10
Eggink 2011b: 18	8	Vollgraaff 2012: 1	17
Ho 2011b: 25	4	Jordan 2012: 3	3
Donnelly 2011: 4	12	Prinsloo 2012: 13	3
Macleod 2011a: 14	3	Eggink 2012: 17	5
Steyn 2011: 15	1	Nkabinde 2012: 13	4
Williams 2011: 15	7	Donnelly 2012: 16	6
Yeld 2011a: 8	3	Fig 2012: 36	7
Yeld 2011b: 4	1	Nel 2012: 15	1
Yeld 2011c: 3	2		
Yeld 2011d: 8	2		

In addition, different words or phrases are used to refer to shale gas, such as “methane gas”, “gas” and “natural gas”. In Table 2, these four lexical entries are presented in terms of how frequently they appeared in the various articles, in order to represent their connotations on a scale from ‘negative’ to more ‘positive’ associations.

Table 2. Lexical entries and frequencies of words denoting “shale gas”

	Lexical item	Number of entries
1	Methane gas	6
2	Shale gas	139
3	Gas	114
4	Natural gas	28

Thus, it is clear from the data presented in Table 2 that the most commonly used terms for the “product” in the media texts of hydraulic fracturing under investigation are “shale gas” and

“gas”. Both are more neutral terms compared to “methane gas”, which constructs shale gas as poisonous and lethal, and “natural gas” which constructs shale gas as being a product of the environment, and is thus more likely to be considered “green” or environmentally friendly (Pascoli, Femia and Luzzati 2001: 188). What is significant to note is that contrasting presentations of hydraulic fracturing – both positive and negative – often occur within the same text.

4.4 Discursive construction of the company

As a primary participant in the practice of hydraulic fracturing, Shell and its activities are constructed by journalists in two primary ways: first, as being knowledgeable, experienced, reasonable and generally concerned about environmental issues; second, as an economic goliath or “giant” (Eggink 2012: 17; Vermeulen 2012: 13; Yeld 2011d: 8) whose predominant concern is for the acquisition of profit at the expense of the environment and the people living in the Karoo. The first construction usually coincides with metaphors that construct the company in human terms, and journalists extend the metaphor by attributing human emotions, such as concern, to the company. Furthermore, journalists construct the company as having the ability to acknowledge the public’s concerns and making an effort to address them. In addition, journalists frequently make use of quotations on behalf of company officials which incorporate pronouns such as “we” and “our” (Donnelly 2011: 4; Donnelly 2012: 16; Eggink 2011a: 14; Eggink 2011b: 18; Eggink 2012: 17; Vollgraaff 2012: 1; Williams 2011: 15). This is a positive construction of Shell to not only present the company as outspoken and open, but also to create affiliation with the reader through the use of third-person plural pronouns. The opposite occurs in articles where the writer constructs Shell as dominant and greedy, or when the writer avoids direct association with the company. In such cases, the company is referred to by name (Ho 2011a: 13; Macleod 2011a: 14; Pressly 2011b: 5; Yeld 2011d: 8).

Shell is positively constructed in some instances as having “decades of experience in natural gas development”, “considerable experience” (Pressly 2011a: 17) and having “sound operational practices” (Eggink 2011a: 14) which have been “successfully performed more than a million times in the US alone” (Eggink 2011a: 14). This constructs Shell as a knowledgeable and qualified company, able to conduct hydraulic fracturing in a sound manner. Shell is further promoted and praised as being responsible for having “created new wealth” in parts of the US (Pressly 2011a: 17) as a result of having generated many job

opportunities contributing to wealth development (Ho 2011a: 13; Mashego 2011a: 4; Mashego 2011b: 13; Pressly 2011a: 17). They are also constructed as having the ability to supply and develop “a secure and sustainable energy supply” (Eggink 2011a: 14; Eggink 2011b: 18; Mashego 2011a: 4; Williams 2011: 15) that would lead to targets being met successfully (Pressly 2011b: 5). Shell is also constructed in positive terms as being able to produce an energy source which is both “economically” and “commercially” viable (Donnelly 2011: 4; Eggink 2011b: 18; Mashego 2011a: 4; Pressly 2011b: 5; Vollgraaff 2012: 1). Relating to the metaphoric construction of hydraulic fracturing as an exploration, Pressly (2011b: 5) states that “Shell was committed to paying fair compensation to land owners to gain access to their land”. Shell is discursively constructed as being “committed” to the environment, society and the economy by stating so specifically, or by making promises and pledges (Donnelly 2011: 4; Eggink 2012: 17; Ho 2011a: 13).

With regard to the negative construction of Shell, the following words and phrases work to discursively construct the company as “bad”: Shell offers “misleading, biased, unprocedural [...], unconstitutional” (Macleod 2011a: 14) and “untruthful” information (Yeld 2011d: 8), as being “economical with the truth” (Yeld 2011d: 8), and having “fatally flawed” plans (Macleod 2011a: 14, Yeld 2011a: 8) which are further constructed as being secretive (Ho 2011a: 13; Jordan 2012: 3; Yeld 2011a: 4; Yeld 2011b: 8). The company is sometimes constructed as being insincere in their concerns and efforts regarding the environment and society or in generating an environmental management plan (EMP), which Fig (2012: 36) describes as a “watered-down version of an environmental impact plan”. It is also constructed as pressurising and influencing the Government (and the public) into making quick and impulsive decisions (Biyase 2011: 9; Fig 2012: 36; Ho 2011a: 13; Jordan 2012: 3; Yeld 2011c: 8). References to past incidents are often alluded to, illuminating Shell’s “bad reputation” regarding legislation and protection of the environment and society (Ho 2011a: 13; Macleod 2011a: 14; Pressly 2012a: 23; Pressly 2011b: 5).

Both negative and positive discursive constructions frequently draw on the common metaphor of business (in this case the “business” of hydraulic fracturing) as a game, where the primary players are Shell, the Government and various governmental task teams, and the public at large. Extensions of this metaphor occur through the use of terms like “game changer” (Donnelly 2011: 4; Donnelly 2012: 16; Mashego 2011b: 13) and “major players” (Pressly 2012: 8 and Yeld 2011c: 3), and through the use of the following phrases: “the

gloves are off in the battle between environmental activists and the department of mineral resources” (Biyase 2011: 9), “stage set for showdown” (Macleod 2011a: 14), “played along with Shell’s strategy” (Macleod 2011a: 14), “size of the prize” (Donnelly 2011: 4), and the previously-mentioned headline “First blood to pro-frackers” (Mashego 2011a: 4).

It is clear from the use of this metaphor that the game is often conceptualised as a harsh and brutal one, and references to it often border on the metaphoric construction of business as war, with reference to the “anti-fracking coalition” (TKAG), who are against shale gas extraction, and “allies” (Nkabine 2011: 13), or environmentalists who will assist in operations that will “dramatically change South Africa’s energy landscape” (Mashego 2011b: 13).

4.5 Discursive construction of the South African Government

As another primary participant in the social practice of hydraulic fracturing, the Government is, at times, positively represented as an “advisory body” (Pressly 2012a: 23) which takes measures to generate a report that acknowledges and provides solutions for negative implications of hydraulic fracturing. The constant reference to the Department of Mineral Resources having placed a moratorium on hydraulic fracturing in the Karoo, and insisting on further negotiations and policy planning, undeniably express an attitude of concern on behalf of the Government (Eggink 2012: 17; Pressly 2011a: 17; Vollgraaff 2012: 1).

When Shell is presented as knowledgeable and reasonable in its efforts to mine shale gas, the Government is most often presented as uninformed and indecisive, preventing sound and beneficial mining and economic practices from materializing. Such examples are present in Pressly (2011b: 5), whose headline reads “Shell may lose interest in fracking if delays continue” and who further references the “countless extensions of the moratorium” and states that if former Minister Shabangu “endlessly extended the moratorium, interest in the project, and willingness to spend about \$200 million (R14m) during the exploration phase alone, would wane”. In addition, Mashego (2011a: 4) quotes a “bemused mining lawyer” who represents “one of the largest foreign mining companies” as claiming that “the state had created difficulties for routine mining operations”. The Government is then also presented as an institution in the way of Shell’s goals and ambitions.

On the other hand, it is often stated that the Government is withholding information from the public and is thus constructed as being secretive and guarded. This discursive strategy on

behalf of journalists is evident in the use of words like “secrecy” (Ho 2011: 13), “untruthfulness” (Yeld 2011d: 8) and “factual discrepancies” (Eggink 2011a: 14). Eggink (2011a: 14) further claims that information on hydraulic fracturing is “of national importance to all South Africans”. In some cases, the Government and its task teams are constructed as short-sighted and “will not see beyond the short-term benefits” (Ho 2011b: 13), frequently making ignorant decisions which are “lacking in substance” (Nkabinde 2012: 13) or making claims which are “deliberately overstated” (Biyase 2011: 9; Donnelly 2011: 4).

4.6 Discursive construction of environmentalists

Where Shell and the Government are presented in a positive light, environmentalists are constructed as critics who are an “obstacle in the way of prospective investors” (Mashego 2011a: 4). Environmentalists are often constructed as aggressive and demanding (Biyase 2011: 9), a threat or obstruction to Shell or the Government (Pressly 2011a: 8; Pressly 2011b: 4; Pressly 2012: 6). They are portrayed as protectors of the environment by being constructed as “the opposition” (Mashego 2011: 4; Yeld 2011d: 8; Yeld 2011a: 8) who critique (Donnelly 2011: 4, Ho 2011b: 25, Macleod 2011a: 14) the industry. Environmentalists are constructed as the opponents of the extractive industry, specifically Shell, stated in section 4.4, who are ready to “fight” (Donnelly 2012: 16; Nel 2012: 15; Vollgraaff 2012: 1) and debate the hydraulic fracturing issue in South Africa.

When Shell and the Government are represented as greedy or ignorant, environmentalists are constructed as “experts” (Donnelly 2011: 4, Steyn 2011: 15, Yeld 2011a: 8) or as rational intellectuals (Biyase 2011: 9; Fig 2012: 36; Macleod 2011a: 14; Mashego 2011a: 4; Nkabinde 2012: 13; Pressly 2012a: 23; Pugh 2012: 28; Steyn 2011: 15; Yeld 2011a: 8). Their concerns and fears then play a legitimate role in the hydraulic fracturing debate, specifically regarding industry and the Government’s pursuit (Vollgraaff 2012: 1) of shale gas in the most economically efficient way while dismissing the environmental impacts and regulations. Environmentalists are often portrayed as providing solutions or alternatives to hydraulic fracturing, such as renewable energy (Fig 2012: 36; Pressly 2011a: 17; Nel 2012: 15). The most significant alternative they propose is that of “dry fracking” (Mashego 2011b: 13), however, this waterless, alternative fracturing method is presented as being mooted (Mashego 2011b: 13; Prinsloo 2012: 13) by some writers. Therefore, environmentalists’ suggestions and expert advice are constructed as unimportant and “too costly” (Nkabinde 2012: 13), placing “profits before people and the environment” (Ho 2011a: 13).

4.7 Discursive construction of the public

In general, and throughout the 32 articles, the public is constructed as being ignorant, concerned, confused and “kept in the dark” (Yeld 2011b: 4) about the “great fracking debate” (Mashego 2011a: 4). Where there is less focus on mass confusion, hydraulic fracturing is presented as a way to address the general public’s concerns about financial and energy issues, as in the following examples: “South Africa stands to gain billions of dollars” (Mashego 2011: 13), hydraulic fracturing may address “South Africa’s energy needs” (Pressly 2012a: 23).

However, where writers appear to take more of an environmentalist stance, the public in general are constructed as being “worried” (Ho 2011a: 13) or sympathetic towards environmental issues, as being “activists” (Biyase 2011: 9; Ho 2011b: 25; Pressly 2012b: 8; Mashego 2011a: 4; Mashego 2011b: 13; Williams 2011: 15). The following phrases are also used by environmentally-concerned writers: “anti-fracking lobby” (Yeld 2011d: 8), “anti-frackers” (Ho 2011b: 25) “anti-fracking campaigns” (Yeld 2011c: 3; Steyn 2011: 15) or “anti-fracking coalition (s)” (Nkabinde 2012: 13; Yeld 2012: 6). The frequent assertion that the hydraulic fracturing debate has opened “deep divisions” (Donnelly 2011: 4; Steyn 2011: 15) is very significant considering South Africa’s unique history. Thus, the hydraulic fracturing debate in South Africa is unique because writers frequently draw on this contested history in order to construct an argument that is for or against hydraulic fracturing (Pressly 2012b: 8).

4.8 Discursive construction of the context

Almost all articles refer to, and simultaneously construct, the “place” (Machin and Van Leeuwen 2007: 61) of the social practice of hydraulic fracturing. However, where a more environmentalist stance is evident, the Karoo is given more content space, often being referred to in terms of its “exceptional” landscape with “natural scenic beauty and biodiversity”, and its status as a “world heritage site” (Yeld 2011c: 3). The Karoo is also portrayed as being “pristine” (Pressly 2012b: 8) and “fragile” (Fig 2012: 36).

Writers frequently allude to the fragile nature of the Karoo due to its status as an “arid” (Eggink 2012: 17; Nel 2012: 15), semi-desert area (Ho 2011a: 13; Pressly 2011b: 5; Vermeulen 2012: 13; Fig 2012: 36) with a shortage of water. Writers usually mention the

“huge quantities” and “millions of litres” (Prinsloo 2012: 13) of water required for hydraulic fracturing to take place, suggesting that the process would destroy, “disfigure” (Vermeulen 2012: 13) or “change the landscape” (Donnelly 2012: 16). In many cases hydraulic fracturing is framed as “a water issue” (Pugh 2012: 28), and the amount of water needed to conduct the hydraulic fracturing process is often referenced. What is important from a CDA perspective is how the writer constructs these issues according to a specific goal or ideology. For example, Pressly (2011a: 17) states that “using millions of gallons of water to extract shale gas in the Karoo can be done without significant environmental damage” (Pressly 2011a: 17). In addition, he constructs environmentalists as being “up in arms” about the water and chemicals used in the mining process (Pressly 2011a: 17). This illustrates how writers take a stance on issues regarding hydraulic fracturing and then present these opinions to the general public who may consume them uncritically.

4.9 CDA analysis of four chosen articles

The previous section characterised the discursive construction of hydraulic fracturing in 32 news articles, identifying shared characteristics or “ways of representing” throughout. However, a primary purpose of a CDA investigation of media texts is to show how journalists construct a particular view of a concept, situation or social practice, and to make the writer’s and institution’s ideologies more explicit (Machin and Van Leeuwen 2007: 60-61; Richardson 2007: 26-27, 115). In order to do this, a close analysis of the text is required. Therefore, the following sections present a close analysis of four new articles, relying on Gee’s (1996) method of CDA. The aim of the analysis is to show how writers use discursive strategies in order to construct a particular viewpoint so as to guide the readers’ perspectives and interpretations of the issue of hydraulic fracturing.

9.1 Article A: “Drakensberg and surrounds face fracking threat too, conservationists warn”, by John Yeld, 13 September 2011.

The following section presents an analysis of John Yeld’s article entitled “Drakensberg and surrounds face fracking threat too, conservationists warn” (2011c: 3). It was published in the Cape Argus on 13 September 2011. (The PDF version of this article can be found on page 110 as part of Appendix B, while the text of the article, with line references, is attached as Appendix C).

4.9.1.1 Prosody

As stated in chapter three, prosody looks at the ways in which writers use textual devices such as punctuation to emphasise concepts in the text, and also assist in the construction of binary oppositions. One key example of prosody in this text is the use of the pregnant pause which acts as an equivalent to devices used in spoken discourse, where pauses between sentences act as intensification strategies:

“Prospecting permits had been granted to Anglo Coal and to a three-company consortium consisting of Sasol and foreign energy giants Statoil and Chesapeake Energy, covering an 88 000km² tract of land right around Lesotho – including the central and southern Drakensberg regions of Kwazulu-Natal, the Eastern Free State and the Eastern Cape Highlands.” (B: 15-18)

Requiring the reader to pause in line 17 rearticulates the article’s central theme, namely the damage that can be done to parts of South Africa, more specifically the Drakensberg regions, if hydraulic fracturing were to be permitted in that area. The use of commas throughout the text also requires readers to pause in order to draw attention to key aspects of the writer’s argument. For example, the headline reads “Drakensberg and surrounds face fracking threat too, conservationists warn”. Here, the detrimental effects of hydraulic fracturing to the Drakensberg area are presented before stating that it is the perspective of the conservationists. The pause (represented by the comma) also places emphasis on the adverb “too”, to mean “as well” or “in addition”. This adverb allows the writer to draw on pre-existing knowledge that the reader may have on the negative effects of hydraulic fracturing in the Karoo and other areas. This is accomplished again in paragraph one, through the use of the adverb “equally” in the statement “there is an equally serious threat to the Drakensberg” (B: 2). Thus, a negative representation of hydraulic fracturing is given from the outset and is established in other parts of the text by referring to the process as a “controversial extraction method” (B: 2) that poses a “serious threat” (B: 2) to South Africa’s natural environment.

4.9.1.2 Contextualisation signals

Stress or emphasis is not only achieved through prosodic features, but also through the use of intensifiers which assist in evoking and constructing the context of the article. Intensifiers are words which intensify, strengthen or even exaggerate the writer’s argument, and usually take the form of adverbs or adjectives which allow the writer to provide commentary on the issue being reported. Yeld (2011c) uses intensification strategies to construct the Drakensberg

region as well as to emphasise the perspective of the conservationists who are hesitant about the use of this mining process. For example, the writer uses the noun “warning” (B: 3, 4) to represent the illocutionary force of the message from conservationists. Rather than a statement or an assertion, the message from the conservationists is constructed as a word of advice or counsel, thus presenting the conservationists as wise seers who have access to the truth. Throughout his article, Yeld (2011c) constructs environmentalists in a positive way, and gives preference to their argument, frequently, and often directly, quoting words from representatives of environmental agencies. For example, Kate Nelson, a local businesswoman from Barkly East in the Eastern Cape, is often quoted (B: 11, 20, 29, 32), as well as the International Union for Conservation of Nature (IUCN) (B: 5, 7, 33, 35) and Tim Badman (B: 34), the director of the ICUNs World Heritage Programme.

In addition, these environmentalist and environmental organisations are presented as expressing apprehension about the damage caused to the natural environment by hydraulic fracturing, while mining companies like Shell, Anglo Coal, Sasol, Statoil and Chesapeake Energy are constructed as using, developing or even “taking advantage of” the natural environment, which is one denotation of the noun “exploitation” (B: 4) and the verb “exploit” (B:11) .

The perspective of environmentalists is rearticulated and reiterated through the repeated use of the noun “threat” (B: 2, 15) and participle “threatened” (B: 6, 10) to construct the consequences of hydraulic fracturing and the activities of oil and gas companies. The use of the adjective “threatened” (B: 6, 10) to describe the effects that hydraulic fracturing may have on the natural environment assists in constructing the environment as fragile, vulnerable and exposed to the dangerous activities of oil and gas companies. For example, after stating the “warning” (B: 3) on behalf of conservationists regarding the “serious threat” (B: 2) to the “Drakensberg and surrounding mountainous areas” (B: 3), the writer adds:

“And a similar warning about the dangers of mining and oil-and-gas exploration and exploitation in Africa has come from the International Union of Conservation of Nature (IUCN), which says one in four of the continent’s “iconic natural areas” are threatened by planned mining and oil-and-gas projects. The IUCN, which advises the UN Educational, Scientific and Cultural Organisation (Unesco) on World Heritage Sites in the “natural site” category, recently expressed concern about the “rapidly increasing number of cases” where sites were threatened by such projects, although it acknowledged that some major players had agreed not to exploit these areas.” (B 3-11)

In this excerpt, mining companies are portrayed as “major players” (B: 10) in the game of hydraulic fracturing (a common metaphoric construction, as mentioned in section 4.4). This constructs companies as the primary culprit in threatening and exploiting the natural environment.

In addition to the writer’s use of intensification strategies to construct the natural environment as fragile and vulnerable to the actions of oil and gas companies, other discursive strategies are also employed which construct not only the natural environment but the Drakensberg more specifically. Yeld (2011c) uses a fair amount of content space in order to contextualise the Drakensberg region and the environment as being exquisite in some way: “top tourist attraction” (B: 22) and “proclaimed World Heritage Site (B: 23); “natural scenic beauty and biodiversity” (B: 24-25), “rich cultural heritage“ (B: 25) “major watershed, with tributaries” (B: 27); “attractive” (B: 30), “exceptional places” (B: 3: 35) and “outstanding value to all of humanity” (B: 37). In addition, Yeld (2011c) adds a quote from Barkly East conservationist, Kate Nelson:

“The fact that the Berg does have water potentially makes it more attractive for fracking than the ‘Karoo Heartland’, and so it is potentially more viable for the oil-and-gas exploration companies.” (B: 30-32)

Through the repetition of the phrase “the Berg” (B: 25-30), Yeld (2011c) incorporates insider discourse from South African, especially KwaZulu-Natal, citizens. This can be seen as a discursive strategy to establish a relationship with the readers. The writer also explicitly states that “it’s the duty of every one of us” (B: 37-38) to protect and conserve the South African cultural heritage and natural environment (B: 38-39). Even though this article’s main theme revolves around the hydraulic fracturing threat faced by the Drakensberg, the writer’s reference to the Karoo as the “Karoo Heartland” (B: 31) constructs the Karoo in a similar way to “the Berg” (B: 25-30) where he establishes a relationship with the reader.

4.9.1.3 Cohesion

Returning again to the excerpt from lines 3 to 11 provided in the previous sub-section, the use of the conjunction “and” in line three allows the writer to intensify his argument about the dangers of hydraulic fracturing. While lines one to three present a general argument from

unnamed conservationists against hydraulic fracturing due to its devastating effects on the environment, lines four to seven draw on the IUCN to attribute these harmful effects to the oil and gas companies. In addition, Yeld (2011c) uses both direct and indirect quotes from “conservationist Kate Nelson” (B: 11) to address the issue of hydraulic fracturing in the Drakensberg area:

The consortium, granted a one-year technical co-operation permit in November last year, was involved in a desktop exploration study which did not involve any drilling at this stage, Nelson said. “Nevertheless it’s a situation that local residents need to monitor closely.” The exploration permits had been granted despite the Drakensberg being one of the country’s top tourist attractions and a proclaimed World Heritage Site. (B: 18-23)

The conjunction “nevertheless” (B: 21) is significant as it works to contradict or challenge the first sentence in this excerpt, which conveys information about the approval to conduct research, a “desktop exploration” (B: 20), into hydraulic fracturing in the Drakensberg region. Through the use of an indirect quote, Yeld (2011c) represents Nelson’s argument but then switches to direct speech in the statement that follows, thus emphasising the assumed responsibility on behalf of the local residents. In addition, the use of direct quotations gives authority to the idea that residents are responsible for the area, as does the final statement of the excerpt which states that exploration rights have been granted “despite” (B: 22) the natural beauty and value of the Drakensberg. The use of the conjunctive preposition “despite” (B: 22) is significant as it allows the author to offer an argument against the granting of a permit, using tourism and natural beauty as primary rationales for protecting the area. In addition, the shift between direct and indirect speech makes it unclear whether this argument is Yeld’s or Nelson’s.

4.9.1.4 Discourse organisation

Investigating the way in which the discourse is organised assists in analysing and interpreting the way in which the writer constructs his/her argument on a macro-level, and also assists in identifying key themes in the text. In Yeld’s (2011c) article, the paragraphs are arranged as follows:

- Paragraph 1 Statement of thesis: hydraulic fracturing poses a threat to the Drakensberg as well as the Karoo
- Paragraph 2 Additional warning by IUCN regarding the damage that may be caused to four of the continent’s iconic natural areas

- Paragraph 3 Further quotation of the IUCN about the increasing danger posed by hydraulic fracturing
- Paragraph 4 Use of quotes from conservationist, Kate Nelson to support thesis
- Paragraph 5 Mention of the permits granted to permit hydraulic fracturing
- Paragraph 6 Further mention of the permits granted
- Paragraph 7 Additional quote on behalf of Nelson on monitoring granted permits
- Paragraph 9 Description of the beauty of the Drakensberg area
- Paragraph 10 Description of the agricultural value of the Drakensberg
- Paragraph 11 Quote by Nelson stating that the Drakensberg is a major watershed area and that hydraulic fracturing may compromise this
- Paragraph 12 Further quotation on the value of the Drakensberg water supply compared to the Karoo
- Paragraph 13 Concerns over hydraulic fracturing in the Drakensberg area
- Paragraph 14 Tim Badman's, the director of IUCN's World Heritage Programme, description of Drakensberg as World Heritage Site
- Paragraph 15 Statement about the outstanding value of Drakensberg areas and duty of everyone to protect and conserve the natural environment
- Paragraph 16 Restatement of paragraph 14: Tim Badman emphasising the duty of the public
- Paragraph 17 Concluding remark: major mining companies have realised the importance of conserving World Heritage Sites and are committed to not damaging them

Investigating the content organisation of a discourse aids in highlighting the way in which the writer constructs and supports his central argument or thesis. With regard to Yeld's article, the central argument is that hydraulic fracturing is dangerous and poses a threat to the Drakensberg. This argument is repeated in the first four paragraphs and again in paragraph 13. These concerns are coupled with the prospect that the beauty and value of the natural environment may be destroyed. The description of the natural environment, specifically the Drakensberg regions, is given the most content space. This description focuses on the Drakensberg as valuable and beautiful, and appears in paragraphs one through to 12 as well as paragraphs 14 and 15. Quotations from environmental organisations, specifically the IUCN, act as evidence for legitimating the importance and value of these areas. The IUCN is referenced in association with, and as the advisory body for, the UN Educational, Scientific and Cultural Organisation (Unesco) on World Heritage Sites (B: 7-8). This emphasises the validity of the IUCN's and Kate Nelson's "concerns" (B: 9, 32) regarding the threat and

degradation that hydraulic fracturing poses on these sites. Furthermore, paragraphs five and six confirm the concerns and threats raised in the article by stating which companies may receive prospecting permits to conduct hydraulic fracturing.

4.9.1.5 Thematic organisation

The themes of this article underpin the discursive structure presented in the previous subsection and emphasise the argument(s). The first theme evident in the discursive structure of the article is that of “the natural environment as fragile”. Terms used by the writer throughout the article that present this theme include: “serious threat” (B: 2); “dangers” (B: 4); “threatened” (B: 7, 10); “exploit” (B: 11); “concern” (B: 9, 32); “impact” (B: 29); “more viable” (B: 31); “protection and conservation” (B: 38); “conserving” (B: 42), and “damage” (B: 43). These terms all suggest that the natural environment requires protection, specifically as a result of the impact that hydraulic fracturing may have on the natural environment. This clearly establishes a relationship between the writer and the reader, the former alluding to the fact that protecting the natural environment is not the responsibility of extractive companies and environmental organisations, but that it is “the duty of every one of us to cooperate” (B: 37-38) in taking care of the fragile, easily harmed and exploited natural environment.

Another theme of the text is “hydraulic fracturing as damaging and invasive”. As exemplified above, the natural environment is presented as being “threatened” and damaged as a result of hydraulic fracturing. This “controversial” (B: 2) extractive method is thus constructed as dangerous by implementing the cohesive strategy of repetition for terms exemplifying this such as: “threatened” (B: 7, 10); “serious threat” (B: 2); “warning” (B: 3, 4); “concern” (B: 9, 32), and “impact” (B: 29). These terms, in association with the intensified verb “exploit” (B: 11) in paragraph three, construct hydraulic fracturing as invasive, harmful and damaging. Presenting the idea of hydraulic fracturing as a form of “mining” (B: 4, 6, 40, 41) as well as “oil-and-gas exploration and exploitation” (B: 4) further illustrates this theme.

4.9.2 Article B: “Shell doing its best to make fracking safe, water friendly”, by Jan-Willem Eggink, 5 October 2011.

Article B is entitled “Shell doing its best to make fracking safe, water friendly” and was written by the general manager for Shell South Africa’s upstream sector, Jan-Willem Eggink (2011a: 14). It was published in The Star newspaper on 5 October 2011. Eggink is a dominant voice in hydraulic fracturing texts, not only because he is the general manager of

Shell South Africa's upstream sector, but also because he writes for many newspaper publications. From the collection of texts used for this study, aside from this article published by The Star, Eggink appears in two others, namely the Sunday Times (Eggink 2011b: 18) and the Cape Argus (Eggink 2012: 17). (The PDF version of this article can be found on page 96 in Appendix B, while the text of the article, with line references, is attached as Appendix D).

4.9.2.1 Prosody

In the article written by Eggink (2011a), a comma is used in the headline instead of a conjunction like "and". This serves to place emphasis on key aspects of his argument, namely that Shell is concerned for the safety of the natural environment. In doing this, the writer creates a correlation and analogy between "safety" and "water friendly", therefore emphasizing the writer's proposition.

In addition, the use of a colon in the sentence "We believe that protecting fresh water aquifers is not difficult: the natural gas in some cases lies thousands of meters below aquifers" (C: 27-28), assists the writer in repeating and simultaneously legitimising the claim made in the headline. However, the writer provides a scientific explanation in this case as to why protecting water is not difficult in the hydraulic fracturing process. The pause, in the form of a colon, places emphasis on his rationale that shale gas lies far below the water that is used for human consumption. The use of the term "natural gas" immediately after the colon is also significant and helps to construct shale gas in positive terms (as mentioned in section 4.3).

Similarly, the writer quotes the International Energy Agency¹¹(IEA) as stating that:

"...total emissions from (shale gas) production are only slightly higher than for conventional gas: and both the water and climate impacts can be mitigated using existing techniques." (C: 57-59)

Once again, a positive presentation of hydraulic fracturing is presented here, using the IEA as an authoritative voice to support the writer's propositions. By incorporating the IEA's statement that the "total emissions from (shale gas) production are only slightly higher than for conventional gas" (C: 57-58), the writer is able to present hydraulic fracturing and shale

¹¹ The International Energy Agency (IEA) is affiliated with the Organisation for Economic Cooperation and Development (OECD) and was founded as a result of negotiations carried out in November 1974 at the Washington Energy Conference (Keohane 1978: 931).

gas in a positive way. Furthermore, the use of the colon, causing the reader to pause before the second part of the statement, places emphasis on the idea that the technology and expertise exist to prevent negative water and climate impacts from the hydraulic fracturing process.

Other authoritative voices that Eggink (2011a) includes to support his claims are the Massachusetts Institute of Technology (MIT), the US National Energy Technology Laboratory, and a study by researchers at Carnegie Mellon. These quotes and references also assist the writer in emphasising the necessity of well-researched and -tested technology and techniques that are required to be carried out by the most skilled professionals. Eggink (2011a) uses this research to support the claims that Shell is organised, skilled and experienced, and values sound research and technology. The following statements illustrate this: “We support regulation that is designed to reduce risks to the environment and keep those living near our operations safe” (C: 14-15); “we believe that protecting fresh water aquifers is not difficult” (C: 27-28); “when a well was designed and constructed correctly, ground water would not be contaminated” (C: 24-25); “we follow strict standards to ensure that wells are constructed correctly” (C: 29-30); “we line our wells with multiple steel and concrete barriers to prevent gas or liquid from leaking out of the well itself” (C: 30-31), and “we do not hydraulically fracture wells unless we have pressure tested the well bore for integrity” (C: 34-35).

An important function of prosody in this text is to identify binary oppositions. In this article, binary oppositions manifest through the repetition of synonymous words. The most salient binary opposition in the text is the opposition between truth/misconceptions. Synonymous terms that construct this binary opposition are: “misconception” (C: 16, 17, 21, 64); “confusion and misinformation” (C: 7); “allegations” (C: 19, 20); “assumptions” (C: 53); “factual discrepancies” (C: 20, 21), and “criticism” (C: 35). Not only does repetition of these terms construct hydraulic fracturing as a contentious issue, it also places emphasis on the contentious aspect of hydraulic fracturing, allowing the writer to construct the issue as confusing and misunderstood before presenting his argument as the truth and simultaneously reinforcing his authority. This is further done through contextualisation signals.

4.9.2.2 Contextualisation signals

In the article, the writer constructs hydraulic fracturing as safe and “environmentally responsible” (C: 65) by referring to the process as “natural gas drilling” (C: 4, 8), an “exploration for natural gas” (C: 10) and “activities” (C: 41, 67). Secondly, it is constructed as beneficial and a promising opportunity for South Africa to assist in the development of a “secure and sustainable energy supply” (C: 18) that could lead to a “shale gas revolution” (C: 26-27).

With the use of various intensification strategies, the writer presents himself as rational, experienced and wise, and able to clear up the many “misconceptions” (C: 16, 17, 21, 64) regarding hydraulic fracturing, revealing the “strict standards” (C: 30) and “sound operational practices” (C: 38-39) on behalf of “the industry” (C: 10-11) and Shell in particular. The writer uses many words and phrases to construct Shell in a positive way, including emphasis on the company as “environmentally responsible” (C: 65), experienced (having “successfully performed” (C: 32) hydraulic fracturing in the past), organised, and able to follow “strict standards” (C: 30). The noun “standard” is used frequently in the article (C: 10, 13, 30), but no mention is made of who sets these standards or who monitors them. For example:

“For the industry, there are two clear tasks at hand: first, we must continue to maintain the very highest operational standards. At Shell, our efforts are underlined by a set of global onshore shale gas operating principles that provide a framework for protecting water, air, wildlife and the needs of local communities. We support regulation that is designed to reduce risks to the environment and keep those living near our operations safe. Second, we need to dispel the significant misconceptions about shale gas production.” (C: 12-16)

This excerpt is significant in that it identifies Shell’s primary task, which is to “maintain the very highest operational standards”. In addition, the excerpt also indicates one of the writer’s core arguments and his use of the rhetorical device of listing. The writer constructs the situation as consisting of only “two clear tasks”, namely “maintain[ing] the very highest operational standards” and “dispel[ling] the significant misconceptions about shale gas production” (C 15-16). By constructing the situation as consisting of only two tasks, many other responsibilities are not mentioned. Furthermore, the use of the plural pronoun “we” is significant and constructs the responsibilities and “tasks” as being an issue not only for Shell, but for the industry and perhaps even the general public. The excerpt also illustrates the binary opposition constructed in the text of truth/misconception. Thus, the writer uses many

strategies to present himself, Shell and the process of hydraulic fracturing in a positive way. One of the more significant and prominent devices is the use of anecdote and imagery in the introductory paragraph of the article:

“Some of you may have seen this image on television or the internet. A man reaches across and turns on his kitchen tap. He takes a lighter and applies it to the stream of water, it bursts into flame. The flame is attributed to the presence of methane gas. It is a powerful image. But it is important to be clear about the source of the gas. While critics suggest natural gas drilling as the cause, there is considerable evidence that dissolved methane gas can occur naturally in ground water. Indeed, according to the department of Water Affairs, methane has been found in shallow water wells in the Karoo.” (C1-7)

This introductory paragraph is important as it allows the writer to refer to, and simultaneously contradict, popular images that portray hydraulic fracturing in a negative way¹². By stating “it is a powerful image”, the writer constructs himself as reasonable and human, also susceptible to images and ideas which may contradict his thoughts and duties as general manager of Shell South Africa’s upstream sector. However, the writer uses a preposition (“but”), a conjunction (“while”) and an adverb (“indeed”) to contest and refute the message conveyed by the “powerful” images, and once again asserts his perspective. Since the use of cohesive devices is significant in how the writer constructs his argument and the effect that it has, these cohesive devices will be addressed in more detail in the following sub-sections.

4.9.2.3 Cohesion

In order for the context of the article to be constructed and understood, cohesive devices are used to link ideas and arguments together. Eggink (2011a) makes extensive use of three cohesive devices throughout the article, namely repetition, the use of auxiliaries and the use of conjunctions and prepositions.

Eggink (2011a) presents Shell in a positive way through the repetition of the plural personal pronouns “we” and “our”. As is laid out in Table 3, these pronouns appear frequently throughout the text. They serve not only to personify Shell but to establish a relationship between the reader, the writer and Shell. It generates a sense of trust and persuades the reader to agree with the writer.

¹² This negative image is most evident in the popular documentary Gasland (Macleod 2011a: 14; Pressly 2011a: 17) which presents a negative perspective of hydraulic fracturing in the US. See also Bartlett (2011).

Table 3. Frequency of personal pronouns “we” and “our” throughout Eggink’s (2011a) text

Pronoun	Line reference	No. of occurrences
We	C: 11, 14, 15, 18, 20, 25, 27, 29, 30, 34, 37, 40, 41, 45, 46, 51, 63, 64, 66, 68	23
Our	C: 12, 13, 30, 40, 42, 43, 67, 69	8

These personal pronouns often appear with auxiliaries in order to intensify the statements of the writer, and also work to construct the writer and Shell as committed:

“Some people disagree as to how South Africa should meet its energy needs in future. We want to promote debate and have a solid discussion based on facts and not misconceptions. At Shell we believe onshore exploration and production can and must occur in an environmentally responsible manner. Anything less is unacceptable. I know that this won’t convince everybody.” (C: 62-66)

In this excerpt, the auxiliaries “can” and “must”, in combination with the personal pronoun “we”, enable the writer to positively construct Shell as sincere, confident and committed to informing and protecting the public. This is common throughout the text:

“Nobody will go short of fresh water because of our operations; either in the exploration phase or if there is any further development. This is a legally binding commitment” (C: 43-44)

The most significant cohesive device used in texts is conjunctions. The last paragraph gives a clear indication of how conjunctions are used in the article:

“And we can never have all the answers but our exploration activities will provide a large amount of answers to the questions, whether the gas is there and can be produced commercially. We’re determined to be transparent and open about our proposals, and to address all concerns” (C: 66-69)

The co-ordinating conjunction “and” at the start of the paragraph establishes a relationship between the last two paragraphs. Eggink (2011a) states in the previous paragraph that not everyone will be convinced that Shell’s hydraulic fracturing activities are “environmentally responsible” (C: 65). This is supported by the statement “we can never have all the answers” (C: 66-67). The contrasting conjunction “but” in line 67 presents a contrasting proposition in

that it emphasises the necessity of hydraulic fracturing as a way to “provide a large amount of answers to the questions, whether [shale] gas is there and can be produced commercially” (Line 67-68). Hydraulic fracturing exploration is then presented as necessary in order to answer as many questions and clarify as many concerns as possible. The context of the article is also reinstated in this paragraph through utilising the co-ordinating conjunction “and” again in line 69. This conjunction links and simultaneously highlights the two main objectives of this article, namely to construct Shell as “transparent and open” about their intentions, regulations and policies, as well as to “address all concerns”.

4.9.2.4 Discourse organisation

The way in which the contents of the discourse is organised highlights the rhetorical strategies used by the writer and also illuminates the major themes of the article. As with the previous article (Yeld 2011c), the structure of each paragraph is represented below:

- Paragraph 1 Anecdote of the perceived danger of hydraulic fracturing
- Paragraph 2 Contradiction of anecdotal evidence
- Paragraph 3 Comment on the confusion and misinformation evident in public opinion; statement that the public has the right to know facts
- Paragraph 4 Statement of the industry’s first task - to maintain high operational standards
- Paragraph 5 Statement of Shell’s efforts to maintain standards
- Paragraph 6 Statement of the industry’s second task - to dispel misconceptions
- Paragraph 7 Expression of Shell’s understanding of the concerns expressed by the public; statement that allegations toward Shell’s operations are incorrect
- Paragraph 8 Articulation of major misconception regarding hydraulic fracturing
- Paragraph 9 First statement providing clarification of the misunderstanding from Shell’s perspective
- Paragraph 10 Second statement providing clarification of the misunderstanding from Shell’s perspective
- Paragraph 11 Personal statement of writer on the success of hydraulic fracturing in the US
- Paragraph 12 Second articulation of the misconception with a statement providing clarification from Massachusetts Institute of Technology (MIT)
- Paragraph 13 Example of a success story in China regarding water use through the use of ground water-storage tanks

- Paragraph 14 Articulation of research from Cornell University which presents a statement that hydraulic fracturing is bad for the environment
- Paragraph 15 Agreement with research from Cornell University
- Paragraph 16 Evidence provided by International Energy Agency (IEA) to contradict the research from Cornell University
- Paragraph 17 Further evidence from Carnegie Mellon on lower carbon emissions of shale gas, confirmed by US National Energy Technology Laboratory
- Paragraph 18 Statement that suggests solution to concerns and misunderstandings
- Paragraph 19 Statement supporting Shell
- Paragraph 20 Conclusion with statement supporting hydraulic fracturing and Shell

The main arguments are structurally presented to construct Shell as “transparent and open” (C: 69) about their intentions, operations and policies regarding hydraulic fracturing in the Karoo. Eggink (2011a) allocates over half of the content space for this argument, often presenting, but then refuting, counter-arguments. In addition, Eggink (2011a) uses the rhetorical devices of assertion and repetition to assert that there are many misconceptions regarding hydraulic fracturing and that Shell is committed to research that investigates the problem in a thorough manner. Thus, Eggink (2011a) positions himself as a revealer of remedies for the problems caused by hydraulic fracturing, presenting his argument as ‘truth’ in the truth/misconception binary presented in the text.

4.9.2.5 Thematic organisation

The first theme evident in the discursive structure of the article is that the “environment can be managed through science, research and technology”. This theme is presented in the article in the form of justification or clarification of the misconceived ideas that the public are presumed to have. Technology is constructed by Eggink (2011a) as providing sufficient evidence to dispel the public’s concerns. As indicated in the previous sub-section, the voices of other participants are presented indirectly, with only a single direct quote from the IEA, so that technology and techniques are presented in a positive way in order to justify hydraulic fracturing as “a force for good” (C: 27).

The second theme evident in this article is ‘Shell having a prominent role in the maintenance of natural environment and generation of economic profit’. This is evident in the constant repetition of safety regulations and policies, as well as the use of various statements to

positively frame hydraulic fracturing and Shell. Examples of sentences which positively frame the process of hydraulic fracturing and Shell include: “our exploration activities will provide a large amount of answers to the question, whether the gas is there and can be produced commercially” (C: 67-68); “the quickest and cheapest way to reduce emissions is to switch power generation from coal to gas” (C: 51-53), and “shale gas under the Karoo may help South Africa develop a secure and sustainable energy supply” (C: 17- 18). Eggink (2011a) strategically associates these statements with the following: “we must continue to maintain the very highest operational standards” (C: 11-12) and “At Shell, our efforts are underlined by a set of global onshore shale gas operating principles that provide a framework for protecting water, air, wildlife and the needs of local communities” (C: 12-14). This is done in order to present Shell as responsible in protecting the natural environment while generating profit, activities and goals that are often considered paradoxical (Zinkhan and Carlson 1995: 5; Zhu 2013: 72).

4.9.3 Article C: “A watchdog with strong bite”, by Michelle Nel, 5 July 2012.

This article is entitled “A watchdog with strong bite” and was written by Michelle Nel. It was published in the Mail & Guardian on 5 July 2012. (The PDF version of this article can be found on page 123 of Appendix B, while the text of the article, with line references, is attached as Appendix E).

4.9.3.1 Prosody

Prosody does not necessarily feature in every text, or necessarily function as a key rhetorical strategy. In this article, stress or emphasis is achieved through the use of intensifiers which assist in evoking and constructing the context of the article.

4.9.3.2 Contextualisation signals

Descriptive words intensify, strengthen or even exaggerate the writer’s argument in constructing the context of the article. The writer is then able to provide commentary on the issue being reported. Nel (2012) uses intensification strategies to construct environmentalists, specifically the TKAG and the Government, but also to emphasise the success of the TKAG which received the not-for-profit organisations award in the Greening the Future Awards. This is indicated in the headline of the article.

The context of an article is not merely given but is alluded to through the discourses that the writer draws on to construct the participants. The context is then presented through the act of textual engagement by the reader (Locke 2004: 59). The writer constructs his-/herself as authoritative through intensification strategies that place stress on particular ideas. The following excerpt presents the two main participants constructed in the article:

“Whatever the government decides about fracking in the Karoo, a small group of volunteers has succeeded in broadening the debate about the controversy and showing what could happen if it was allowed to go ahead.” (D: 1-3)

The Government and “a small group of volunteers” (D: 1) are presented in this excerpt. It is the first paragraph of the text and thus sets the context of the article. In addition to referring to hydraulic fracturing as a “controversy” (D: 2) between the Government and volunteers, the verb “succeeded” (D: 2), used to describe the effect of the volunteers’ efforts, allows the writer to construct the volunteers as liberators who have managed to widen the debate, and challenge the Government’s perspectives and decisions. The relationship between the Government and the volunteers is also constructed as oppositional and antagonistic rather than supportive. In addition, the adjectival phrase “small group”, used to describe the volunteers, presents them as fragile and slight in comparison to the Government, and stating that the volunteers have shown “what could happen if it (hydraulic fracturing) was allowed to go ahead” presents the volunteers as better informed than the Government.

The “small group of volunteers” is later identified as the TKAG. The writer frequently constructs TKAG in positive terms, often alluding to their position as a “non-profit organisation” (D: 6) and their reliance on “public donations” (D: 26), even though they were “initially self-funded” (D: 25). This works to construct the organisation as empathetic and benevolent, and the organisation’s staff as determined despite difficulties. In addition, the writer quotes the judges of the Greening the Future Awards as describing TKAG as a “kind of campaigning civil society watchdog” (D: 30) which protects the people against bad Government decisions. Not only is this evident in the first paragraph (as illustrated earlier), but in a quote from Deal, chairperson of TKAG:

“We oppose fracking until it is proven that this is the best answer to South Africa’s energy and employment needs [...] We are urging the government to refocus on renewable energy sources, which are often forgotten in the rush to mine shale gas” (D 11-14)

The use of verbs such as “oppose” and “urge” portray TKAG as strong-willed and determined and, in the context of the article, it assists in presenting the writer as an advocate for TKAG’s causes. In addition, the inclusion of this quote works to cause doubt as to whether shale gas is “the best answer to South Africa’s energy and employment needs” (D: 12), particularly when the action to mine shale gas is described as a “rush”, which has connotations of hurriedness or acting before the situation has been properly investigated, hence constructing hydraulic fracturing as a craze or current obsession. This is picked up again in line 18, where the writer describes Deal as not being able to “fathom why the government is chasing fossil fuel”.

Deal is the main voice that is directly (and indirectly) quoted throughout the article. He is given the majority of the content space, meaning that his ideological perceptions on hydraulic fracturing are being evoked through the writer who is then constructed as an environmentalist herself. Emphasis is placed on Deal as a “semi-retired” (D: 21-22) farmer whose farm “is not near the areas that could be affected by fracking” (D: 22-23). This is an argumentative strategy that reinstates the TKAG as benevolent saviours, willing to fight for a cause that may not directly affect them. A metaphor in paragraph four further intensifies the Government as the opposition and rival by constructing the government and “environmental lobby groups” (D: 9) as players in a card game:

“Pressure from his and other environmental lobby groups forced the government's hand in placing a moratorium on fracking last year and setting up a task team to investigate shale gas extraction.” (D: 9-11)

The clause “forced the government’s hand” constructs hydraulic fracturing as a game in which “the government” (D: 1, 8, 10, 13, 18), TKAG (D: 6-7, 24), “environmental lobby groups” (D: 9), Deal (D: 6, 13, 18, 21, 26), “the Greening judges” (D: 28) and “international giants” (D: 27) are all players. The government is then constructed as being under “pressure” (D: 9) in deciding whether to “fold” or to “call” the proposals of environmental groups, eventually being “forced” (D: 9) into placing a moratorium on hydraulic fracturing. This metaphor is further elaborated on in the final paragraph where the writer directly quotes “the Greening judges” (D: 28) as referring to the hydraulic fracturing debate and issue as “heading for an interesting showdown” (D: 32).

4.9.3.3 Cohesion

Cohesive devices establish relationships between clauses and sentences. They are used as intensification strategies in order to place emphasis on what is being said. As stated earlier, Deal is a dominant voice in the text and many of the conjunctions used can be attributed to him. However, the writer has chosen to incorporate particular statements on behalf of Deal in her text. Consequently, these cohesive devices can be viewed as being repetitive of the author's argument. Consider the following excerpt from the article:

"The environmental fight is long, lonely and costly," Deal said. "But had we not begun this campaign, international giants would already be exploiting this resource in spite of not fully understanding the technology or its impacts"(D: 26-28)

Here, the preposition "but" works to challenge the statement that "the environmental fight is long, lonely and costly". It works to promote the effort of the TKAG campaign as a way to combat the "energy giants" and win the war in the protection of the environment. Throughout the text, preference is given to TKAG and their perspectives, reiterated through the use of pronouns which frequently refer back to Jonathan Deal and TKAG.

In addition, terms or clauses that allude to the dangers of hydraulic fracturing are repeated throughout the article. Examples include "controversy" (D: 2); "controversies" (D: 16); "threatens" (D: 7); "precautionary principle" (D: 8); "investigate" (D: 11); "warn" (D: 17); "exploiting" (D: 27); "could be affected" (D: 22); "in spite of not fully understanding the technology or its impacts" (D: 27-28). These terms and phrases all have negative connotations, while the more positive terms are reserved for TKAG, for example, "succeeded" (D: 2); "helped" (D: 29); and "watchdog" (D: 30).

4.9.3.4 Discourse organisation

The cohesion of the article is illustrated by the content organisation of the text which is structured into larger units of language taking the form of paragraphs. As with the analyses of the previous two articles, the structure of each paragraph is represented below:

- Paragraph 1 Introductory statement highlighting the success of the TKAG
- Paragraph 2 Description of what hydraulic fracturing is and explicit mention of Shell, among other energy companies, seeking exploration rights

- Paragraph 3 Indirect quote by Deal on the dangers of hydraulic fracturing
- Paragraph 4 Statement of the power and authority of environmental lobby groups
- Paragraph 5 Direct quote by Deal opposing hydraulic fracturing
- Paragraph 6 Another direct quote by Deal suggesting renewable energy as an alternative
- Paragraph 7 Brief description of the history of TKAG
- Paragraph 8 Third direct quote by Deal about taking action against hydraulic fracturing through talks at schools
- Paragraph 9 Fourth direct quote by Deal about suggestion and evidence of renewable energy sources as an alternative
- Paragraph 10 Brief background of Deal
- Paragraph 11 Statement on TKAG
- Paragraph 12 Fifth direct quote by Deal establishing success of TKAG
- Paragraph 13 Indirect quote by the Greening judges
- Paragraph 14 Direct quote by the Greening judges

What is evident in highlighting discourse organisation in this way is that half of the content space involves quotations from either Jonathan Deal or the Greening judges, both of whom are associated with environmentalism and take a position against hydraulic fracturing. The other half of the content constructs the major participants in this article, namely the Government, TKAG and Deal himself. Deal receives a paragraph dedicated to only him by the writer who allocated four out of the other eight paragraphs to the TKAG.

The rhetorical strategies discussed above all assist the writer in presenting this article as truthful in order to persuade the reader with what is said. Paragraph two and 12 are linked in that the blame for this controversial issue is placed on “Shell and other energy companies” (D: 4-5) and “international giants” (D: 27) who “would already be exploiting this resource in spite of not fully understanding the technology or its impacts” (D: 27-28). Thus, energy companies and Shell are predominantly presented in the text as irresponsible. In addition, a portion of the public is also constructed as irresponsible; the writer suggests this by directly quoting Deal who conducts presentations for children stating that “they will pay for their parents’ bad decisions” (D: 17).

4.9.3.5 Thematic organisation

There are two major themes in the text, namely "hydraulic fracturing not being a viable solution to South Africa's energy and employment needs", and "non-profit or volunteer organisations being beneficial to society". With regard to the first theme, the writer illustrates this through her use of terms or clauses with negative connotations, such as "the rush to mine shale gas" (D: 14); "controversy" (D: 2) and "chasing fossil fuel" (D: 18). She also emphasises the first theme by directly quoting Deal when he says "we oppose fracking until it is proven that this is the best answer to South Africa's energy and employment needs" (D: 10-12). The impracticality of hydraulic fracturing is also echoed through the repetition of terms alluding to danger, such as "threatens" (D: 7); "precautionary principle" (D: 8); "warn" (D: 17); "impact" (D: 28), and "affected" (D: 22). These terms, when viewed with the aforementioned themes in mind, emphasise the TKAG as successful, regardless of whether hydraulic fracturing is permitted because the group "helped to make sure it would happen in a more responsible way" (D: 29-30). The TKAG is constructed as a saviour to the natural environment.

The second theme, that "non-profit or volunteer organisations are beneficial to society", constructs the TKAG as powerful and authoritative in challenging Governmental power by having "forced the government's hand in placing a moratorium" (D: 9-10) and having "succeeded in broadening the debate about the controversy" (D: 2), thereby illustrating what not-for-profit organisations aim to achieve. They aim to compete and challenge MNCs or "international giants" (D: 27). These groups are generally humanitarian groups that rely on "public donations" (D: 26), "volunteer efforts" (D: 25) through "campaigning civil society" (D: 30). They rely on public presentations, "media releases, brochures and comics" (D: 15-16) for exposure and support.

4.9.4 Article D: "Karoo shale must be explored", by Danie Vermeulen, 26 August 2012.

Article D is entitled "Karoo shale must be explored" and was written by Danie Vermeulen. It was published in the Sunday Times on 26 August 2012. The headline is presented in the form of a command. This sort of instruction or order, indicated by the verb "must" is unique when compared to many other articles on hydraulic fracturing, which often offer rationales for engaging in this mining practice before taking a stance as explicit as this. However, this does not mean that the writer does not allude to the debate or argument around hydraulic fracturing

during the article. In fact, the writer constructs the conversation about hydraulic fracturing as a “furious war” (E: 3), extending the metaphor by stating that “the voice of the opposition became so intense” (E: 3). Hence, what the writer does is assert this claim, thereafter providing rationales for it by utilising those of the Government and large oil and gas companies. (The PDF version of this article can be found on page 138 of Appendix B, while the text of the article, with line references, is attached as Appendix F)

4.9.4.1 Prosody

In the first paragraph, the writer incorporates prosody in order to emphasize the claims of the “energy giants” (E: 1):

“Since the energy giants Shell and Sasol first announced plans to explore for Shale gas in the Karoo – which they say could help resolve South Africa’s energy crisis – various interest groups have been embroiled in a furious war in the media” (E: 1-3)

The use of the hyphens enables the writer to include information so as to construct the “energy giants” in a positive way. It allows him to present a rationale for the demand made in the headline. However, this rationale is contrasted by the rest of the sentence in that it is stated that “various interest groups” (E: 2) initiated the debate which the writer describes metaphorically as a “furious war” (E: 3).

Prosody is not only used to extend a sentence in order to support a claim; it is also used as a tool in order to clarify and rationalize the statement made in providing evidence for why hydraulic fracturing must occur:

“Furthermore, exploration will help us understand the geological and water make-up of the Karoo. We already know that what makes South Africa’s case unique is the presence of dolerite in the shale rocks but we need to know at what depth it can be found, and hence the extent to which it will affect the fracturing process, which takes place at depths of at least 3km beneath the surface.” (E: 17-21)

The pregnant pause, in the form of the comma in line 20, illustrates this in clarifying the depth at which the drilling occurs in order to clarify the “unique” (E: 18) case of dolerite rocks found in the Karoo. The writer is then able to reinstate the necessity for South Africa to “explore” (E: 1) the Karoo.

4.9.4.2 Contextualisation signals

As previously mentioned, writers draw on intensification strategies to accentuate aspects of the text they consider important or want to emphasize. To use an example from this article, the use of the adjectival phrase “so intense” (E: 3) to describe the intensity of the “voice of the opposition” (E: 3) or those that took an environmentalist stance, allows the writer to construct the oppositional voice as passionate and extremist, a position contrasted throughout the text to the rationality of science and the writer himself. This is reiterated in lines 33 to 34, where the writer describes environmentalists as “fans” of the Karoo, who “are concerned that production platforms will disfigure the landscape”. Here, the noun “fan” (E: 33) constructs environmentalists in a way that diminishes their position as authoritative and reliable, and reduces them to naïve and adolescent bystanders. They are further constructed as having superficial interests in the aesthetics of the natural environment, described as “landscape” (E: 34), a term which emphasizes the scenic nature of the natural environment. The writer does not mention legitimate concerns on behalf of environmentalists.

The following excerpt illustrates how the use of intensification strategies, in this case the mention of science and facts, not only indicates binary oppositions that are constructed in the text, but also evokes the context of the news article:

“As with any scientific decision, it is important to guard against being guided by emotion and rather look at facts. I have recently returned from a third study tour in America, the only country in the world where hydraulic fracturing is practiced widely. As a scientist, I wanted to understand the underlying facts and, especially, the risks and if they can be mitigated.” (E: 6-10)

The writer constructs the decision to mine for shale gas as a “scientific decision” (E: 6) that requires rationality, before revealing that he is himself a “scientist” (E: 9) and, by extension, capable of being rational. Constructing hydraulic fracturing as an issue for science is an argumentative strategy that has many implications, one of which is that it excludes the public from engaging in this debate as they may not be rational or informed enough. The elevated position of scientists and scientific thought is reiterated throughout, especially when the writer suggests that “some of the most senior geologists in South Africa believe there is enough water in the Karoo” (E: 31-32). These geologists remain unnamed, and the use of the verb “believe” (E: 32) gives an indication that this inclination is not based altogether on scientific reasoning. The writer adds, “I believe thorough tests are needed to determine

whether such views are correct” (E: 32-33), thus establishing himself as taking the most rational and balanced approach.

Apart from the use of the personal pronoun “I” (E: 7, 9, 32), the writer also uses “we” (E: 18, 19, 21), “our” (E: 15, 16) and “us” (E: 15, 17) within the article. These personal pronouns establish a relationship between the writer and the reader, as previously stated. It enables the writer to appear truthful and trustworthy, which assists in persuading the readers to agree with the argument established in the text – that “Shale gas must be explored”, as stipulated in the headline. Vermeulen’s (2012: 13) use of the personal pronoun “we” is different in comparison to Egginks (2011a: 14) in article B in that it refers to scientists and, by implication, a reader who considers him-/herself to be rational and knowledgeable, like scientists. The reader as the “outsider” then becomes a part of the “in-group” of scientists who make scientific decisions that are ruled by facts, not emotion, and wish to explore the Karoo for scientific purposes in an “environmentally friendly way” (E: 14).

“If the gas can be extracted economically and in an environmentally friendly way, the shale gas reserves can help us tremendously with our growing energy needs. But it is vital to understand the actual extent of our reserves can only be confirmed through exploration. Furthermore, exploration will help us understand the geological and water make-up of the Karoo. (E: 15-18)

The use of the pronouns “our” and “us” in the excerpt above assists in not only emphasizing the necessity of another energy sources but also the necessity of shale gas exploration. The pronouns generate a sense of responsibility in the reader and construct the readers as a part of the “in-group”. It also shares the responsibility of scientists as the ones who are to discover and confirm “the actual extent of our reserves” (E: 16) and “understand the geological and water make-up of the Karoo” (E: 17-18) in order to “help us tremendously with our growing energy needs” (E: 15). Power and authority that scientists bear is then also shared with the reader, who is then constructed as powerful enough in order to make a “scientific decision” (E: 6) based on facts, not emotion.

Other reiterations concerning the elevated position of scientists and rational decisions come in the form of “data” (E: 12) and statistics. Scientists are constructed as looking at the facts (E: 7) rather than being “guided by emotion” (E: 7). It is this construction and the generally accepted perspective that scientists provide evidence based on the facts and research that

legitimize the “data” and statistics presented. The writer’s use of the personal pronoun “I” mentioned above appears within scientific reasoning in paragraphs four and 14. This reiterates the rationality, confidence and trust that characterize a scientist. It is this construction that places a form of authority or prestige on scientists. The rhetorical questions posed in the text can thus be affiliated with the collection and research of data and statistics that hold the power to answer these rhetorical questions truthfully and based on facts.

Unlike in other media texts, the issue of water usage is not constructed as a major problem, but rather as a “big challenge” (E: 23-24), which implies that it is a situation that can be overcome through science and determination. Hydraulic fracturing is also constructed in animate terms, for example, as a “very thirsty process” (E: 24). Since the adjective “thirsty” usually applies to sentient beings who have been prevented access to water, the metaphorical construction permits an interpretation of hydraulic fracturing that is somewhat more positive in comparison to others which focus on the amount of water the process utilizes. Although this is evident in the sentences that follow, the writer ends that section with a rhetorical question (“So is there enough water for hydraulic fracturing?” (E: 28)) before answering with an optimistic response. In fact, rhetorical questions occur frequently throughout the text, a rhetorical device which aims to guide the reader to accept an argument (Weide and Stolley 2013), since the writer answers the question which the reader cannot. Examples from this article include “How much traffic will be on the roads?” (E: 41-42); “What about the economic boost?” (E: 44), and “Which one is the solution?” (E: 50). All of these, answered by the writer, allude to the demand made in the headline, which initially established the context in which the article takes place.

4.9.4.3 Cohesion

Throughout the article, the writer frequently presents a counter-argument (often through the use of rhetorical questions), but then uses statistics or reason to present his ideas or perspectives to promote the benefits of shale gas exploration. This is also done through the use of the preposition “but” in paragraphs 7, 8 and 18. In paragraph 7, “but” (E: 15) is used to begin the sentence in order to counter the statement made in the previous paragraph. This preposition emphasizes the necessity of exploration to occur in order to confirm the shale gas, presumed to be located in the Karoo, as being economically viable through an “environmentally friendly way” (E: 14).

Similarly, the instance of “but” in line 19 acts as a marker that once again places emphasis on the necessity of exploration to occur in the Karoo. However, within this context, “but” here is used in relation to the knowledge that the Karoo consists of dolerite rocks that need to be researched and explored in order to determine how this rock formation can affect the fracturing process (E: 20). This preposition thus establishes a concern for the hydraulic fracturing process, not the effect that the process will have on the natural environment, but how the natural environment will impact the process. The final instance of “but” in paragraph 18 further emphasizes the commercial viability of hydraulic fracturing as benefiting the public indirectly. This assists the writer in winning over the reader through honesty regarding the lack of on-site jobs created in the US which implies that, as a result of the hydraulic process taking place, particular infrastructure was and will be a possibility which could then essentially provide employment opportunities and widespread benefits for local communities.

Apart from constructing the decision to mine for shale gas as a scientific one (E: 6), like many companies who try to “sell” hydraulic fracturing to the public, the writer constructs hydraulic fracturing as an “exploration” (E: 4, 13, 16, 17, 23, 41, 43, 47) and repeats the term throughout the text. This is a cohesive device that binds the texts together, particularly paragraphs 5 to 9 which set out the rationale for why hydraulic fracturing should take place. It is also obvious from the headline “Karoo gas must be explored” that the writer uses a lot of content space to identify the positive aspects of shale gas exploration. This is highlighted in the discourse organisation which is elaborated on in the following section.

4.9.4.4 Discourse organisation

- Paragraph 1 Statement that constructs hydraulic fracturing as a “furious war” (E: 3) between “energy giants” (E: 1) and “various interests groups”
- Paragraph 2 Statement attributing the moratorium to “the voice of the opposition” (line: 3) as well as a mention that further research needs to be conducted
- Paragraph 3 Statement of second thesis: hydraulic fracturing is a scientific issue and, like all scientific issues, it must involve research into the “facts” (E: 7, 9, 47), relinquishing emotional or irrational views
- Paragraph 4 Writer presents himself as a scientist who is engages in proper scientific research

- Paragraph 5 Presentation of statistical data and evidence regarding South Africa's shale gas deposits
- Paragraph 6 Further information regarding statistical data and a hypothetical statement about the economic and environmental benefits of hydraulic fracturing
- Paragraph 7 Rearticulation of first thesis: the possible effects of hydraulic fracturing can be fully understood through exploration
- Paragraph 8 Elaboration on the benefits of the exploration
- Paragraph 9 Statement of what we do not know about hydraulic fracturing
- Paragraph 10 Rearticulation of first thesis: the importance of an exploration to confirm or refute the positive effects of hydraulic fracturing
- Paragraph 11 Information about water as a challenge for hydraulic fracturing in the Karoo
- Paragraph 12 Information about the water situation in the Karoo
- Paragraph 13 Correlation to Texas
- Paragraph 14 Perspective of "senior geologists" that there is enough water; rearticulation of first thesis
- Paragraph 15 Statement of concerns from environmentalists and mention of the restrictions placed on explorations
- Paragraph 16 Statement of the area reserved for exploration
- Paragraph 17 Positive argument against traffic concerns
- Paragraph 18 Positive argument for economic development
- Paragraph 19 Strong assertion that South Africa is short of energy
- Paragraph 20 Rearticulation of paragraph 19, using Mpumalanga as an example
- Paragraph 21 Contrast between shale gas and nuclear power.

The writer structures the discourse in such a way as to emphasize the demanding statement made in the headline. He structures the article in a way that positively constructs hydraulic fracturing based on a necessity to find answers and make "scientific decisions" (E: 6) that are based on "facts" (E: 7, 9, 47) through the strategic use of rhetorical questions. After establishing the context of the argument, he legitimises the contextual statements by presenting and answering the rhetorical questions posed where he justifies his answers with data and statistics.

4.9.4.5 Thematic organisation

The key theme in this article is that “scientific reasoning is valuable and important”. This theme is established throughout the entire article by the repetition of terms that allude to science and scientific reason, for example: “scientific decision” (E: 6); “facts” (E: 7, 9, 47); “scientist” (E: 9); “calculations” (E: 12), and “tests” (E: 32). Terms such as these assist in constructing the writer and his argument as legitimate and truthful while persuading the reader to agree with what is being said.

4.10 Conclusion

The aim of this chapter was to provide an analysis of the selected media texts on hydraulic fracturing. The first part of this chapter provided an overview of the shared discursive strategies of the 32 selected texts, focusing on the way in which the elements of the social practice of hydraulic fracturing are presented. The second part of the chapter drew on Gee’s (1996) method of CDA to conduct a close analysis of four of the 32 articles under investigation. This section indicated how writers use linguistic devices like prosody, contextualisation signals, discourse organisation, cohesive devices, and thematic organisation to construct hydraulic fracturing in ways that are persuasive and often shared. In the following chapter, the four articles will be compared and contrasted in order to relate them to the data presented in the first section of this chapter.

Chapter 5: Conclusion

5.1 Introduction

This study set out to present a critical discourse analysis of South African media texts on hydraulic fracturing between 2011 and 2012. The guiding theory and central concepts of the study were set out in chapter two. As a theoretical starting point, the study conceptualised hydraulic fracturing as a social practice consisting of five elements, namely participants in different participant roles, activities, times and places, skills, as well as the required tools and materials. The primary focus of this study was on how writers discursively construct hydraulic fracturing, as well as the context of and the participants involved in hydraulic fracturing. In addition, the research sought to understand the hidden ideologies that led to these discursive constructions and to make them more transparent. In order to do this, chapter four not only presented an overview of 32 media texts, but relied on Gee's (1996) framework to closely investigate four of these texts.

This chapter involves a comparison and contrast of the discursive strategies used by writers in the media texts to construct hydraulic fracturing in positive or negative ways, with the primary aim of addressing the two research questions articulated in section 1.4. That is, to indicate (i) how media texts from a variety of media publications discursively construct the social practice of hydraulic fracturing, and (ii) to identify the ideologies that are evident in, and dominate these representations.

5.2 Dominant representations of hydraulic fracturing

As stated from the outset, hydraulic fracturing is perceived in both positive and negative ways, where even the scientific literature is not unanimous regarding the possible effects of hydraulic fracturing on the environment. However, this does not prevent media writers from presenting hydraulic fracturing in either positive or negative terms, often drawing attention to the "great fracking debate" (Mashego 2011a: 4) in the headlines "Fracked if you do, fracked if you don't" (Donnelly 2011a: 4) and "Public kept in the dark regarding progress of fracking team" (Yeld 2011b: 4), or within the text itself (see for example: Bayise 2011: 9; Donnelly 2011: 4; Fig 2012: 36; Mashego 2011a: 4; Mashego 2011b: 13; Nel 2012: 15; Pressly 2012b: 8, Pressly 2012c: 15; Prinsloo 2012: 13; Steyn 2011: 15).

It is worthy to note that all four articles that were closely investigated draw attention to the contentious nature of hydraulic fracturing. In Article A by Yeld (2011a), pregnant pauses allow the writer to construct hydraulic fracturing as a “controversial extraction method” (B: 2). In Article B, Eggink (2011a) uses prosodic features and repetition throughout the text to construct a dominant binary opposition between ‘truth’ and ‘misconception’, and refers constantly to “confusion and misinformation” (C: 7) concerning hydraulic fracturing. In the first paragraph of Article C, Nel (2012) refers to the hydraulic fracturing “debate” (C: 2), but later refers to it as a game where environmental lobby groups had “forced the government’s hand” (D: 9-10). Similarly, Vermeulen (2012), in Article D, constructs hydraulic fracturing as “a furious war” (E: 3), where environmentalists are represented as “the voice of the opposition” (E: 3).

As stated in section 4.3, media writers frequently construct hydraulic fracturing in terms of war or game metaphors, drawing on the common metaphor of “business is a game” (in this case the “business” of fracking), where the primary players are Shell, the government (and various governmental task teams) and the public at large. Extensions of this metaphor occur through the use of terms like “game changer” (Donnelly 2011: 4, Donnelly 2012: 16, Mahego 2011b: 13) and “major players” (Pressly 2012: 8 and Yeld 2011c: 3), but also in various other ways as the following examples indicate: “the gloves are off in the battle between environmental activists and the department of mineral resources” (Biyase 2011: 9), “stage set for showdown” (Macleod 2011a: 14), “played along with Shell’s strategy” (Macleod 2011a: 14), “size of the prize” (Donnelly 2011: 4), and the headline “First blood to pro-frackers” (Mashego 2011a: 4).

Constructing hydraulic fracturing as a contentious issue, and using metaphors to elaborate on this, works as a rhetorical strategy to present the writers’ claims as valid. As is clear from the analysis in chapter four, writers use many linguistic strategies to present their perspective of hydraulic fracturing as legitimate. These include prosody, intensification strategies like repetition, contextualisation signals such as the use of auxiliary verbs, rhetorical devices like metaphor, as well as imagery and anecdote, and they also organised the discourse and themes in such a way so as to place importance on key ideas. Since dominant representations are either positive or negative, these will be addressed separately below.

5.2.1 Positive representations of hydraulic fracturing

Subsequent to the close analysis of the four articles presented in section 4.9, it is clear that Article B (Eggink 2011a), and Article D (Vermeulen 2012) construct hydraulic fracturing in positive terms. While it is logical that Eggink (2011a), as the general manager for Shell South Africa's upstream sector, would want to present the company as good and ethical, there is no obvious reason for why Vermeulen (2012), an academic, would want to do this. Yet, they do so in shared ways, of which the most notable draw on scientific rationality and making specific reference to science, technology and "facts" (C: 17, 64; E: 7, 9, 48) in order provide an argument in support of hydraulic fracturing, and also to present themselves as rational and balanced in their approach. In fact, both writers use many linguistic devices to portray themselves as rational and open-minded, including the use of scientific evidence and quotations from notable academic institutions such as MIT (C: 36), IEA (C: 54, 57), a Carnegie Mellon research paper (C: 60), a Cornell University research paper (C: 53) and the Institute for Groundwater Studies (E: 51).

In addition, both Eggink (2011a) and Vermeulen (2012) use prosody and intensification strategies to construct binary oppositions related to truth/misconceptions (Eggink 2011) on the one hand, and science/emotion (Vermeulen 2012) on the other. In both articles, the writers clearly align themselves with the 'truth/science' poles, while distancing themselves from the 'misconception/emotion' poles. This is done in many ways, most notable of which is relegating environmentalists or "fans" (Vermeulen 2012) to the position of irrational and uninformed bystanders, predominantly concerned with frivolous issues. In addition, both writers repeat the personal plural pronouns "we", "our" and "us" in their texts to create a relationship with the reader in an effort to get the latter to agree with the argument being presented, and use auxiliaries such as "must" and "will" to make strong assertions about the context of the argument.

Apart from positive self-presentation strategies, both Eggink (2011a) and Vermeulen (2012) construct hydraulic fracturing in positive terms, referring to "natural gas" (C: 4, 8, 10, 28) and "shale gas" (C: 9, 13, 16, 17, 19, 37, 50, 55, 57, 60; E: 1, 4, 6, 10, 15, 49). Eggink (2011a) refers to "methane gas" (C: 3) only when referring to the anecdotal evidence used to present the dangers of hydraulic fracturing, which he swiftly refutes in paragraph 3. While both writers do not explicitly construct hydraulic fracturing in positive economic terms (as was the case with Malin's (2013) research in section 2.4.2), they both present it as a way to

address South Africa's "energy needs" (C: 63; E: 15), drawing a direct comparison to coal (Egging 2011a; Vermeulen 2012) and nuclear power (Vermeulen 2012). Eggink (2011a) claims that "shale gas-fired power still emits only about half the CO₂ of coal-fired power" (C: 60-61) while Vermeulen (2012) claims that the "coal supply in Mpumalanga will be exhausted over the next 30 years and most power stations in Mpumalanga will close down" (E: 48-49). Both writers then resort to the rhetorical fallacy of oversimplification to present a complex argument as consisting of only two sides, before presenting hydraulic fracturing as the most plausible option, drawing on hydraulic fracturing as "an economic asset" (Pudlick et al. 2012: 9). As stated in section 2.4.2, apart from the employment benefits, hydraulic fracturing is often constructed in the media as beneficial due to its status as a "transition fuel" or "alternative energy source" (Stephenson et al. 2012: 452), which presents a "greener" perspective of fossil fuels (Fig 2012: 31). Neither of the writers refers to renewable energy sources such as solar power, as Nel (2012), who takes a more environmentalist stance on the issue, does in her article.

5.2.2 Negative representations of hydraulic fracturing

As is evident from the analysis in chapter four, Article A (Yeld 2011c) and Article C (Nel 2012) present the most prominent arguments against hydraulic fracturing. Both articles alert the readers to the dangers that hydraulic fracturing pose to the natural environment, as indicated in the results of Pudlick et al.'s (2012) study, and the power that MNCs like Shell and other energy companies have to deplete natural resources in the pursuit of profit. While Yeld (2011c) is an "Environment & Science Writer", Nel (2012) is a journalist who writes about many issues for the Mail & Guardian, but they both take a similar stance towards hydraulic fracturing in their texts, drawing on similar discursive strategies in order to do so.

In comparison to Article B and D discussed above, both Yeld (2011c) and Nel (2012) allocate a fair amount of content space to describing nature in aesthetic and fragile terms, referring to specific regions in South Africa that may be "threatened" (B: 6, 10; D: 7) by hydraulic fracturing and the actions of "international giants" (Nel 2012), who exploit (B: 4, 11; D: 27) "this research in spite of not fully understanding the technology or its impacts" (Ne 2012). Thus, these writers are critical of the technology and scientific evidence used by MNCs and, rather than relegate environmentalists and conservationist to the level of ignorant bystanders, Yeld (2011c) and Nel (2012) construct them as "experts" (Donnelly 2011: 4, Steyn 2011: 15, Yeld 2011a: 8). In Articles A and C, quotes from environmentalists and environmental

groups validate the writers' arguments in much the same way as quotes from academic institutions validate Eggink's (2011a) and Vermeulen's (2012) claims, hence presenting themselves as "truth-sayers" (Locke 2004: 60) who intend to reveal facts in order to inform the public.

Unlike Eggink (2011a), and Vermeulen (2012), Yeld (2011c) and Nel (2012) do not use plural pronouns like "we" and "us" repeatedly in the text, but do refer to "the Berg" (B: 25, 30), the "Karoo heartland" (B: 31) and to Deal's "love" (D: 23) for the Karoo landscape. Like the personal pronouns used in Articles B and D, these terms draw on the "concerned" reader and persuade them to agree that the Karoo and the Drakensberg need to be protected.

5.3 Summary of research aims and achievements

The analysis of this study revealed that writers of media articles use similar discursive strategies to construct the social practice of hydraulic fracturing in either positive or negative ways. Based on the theory presented in chapter two, it can be said that positive constructions of hydraulic fracturing (such as those articulated in Eggink 2011a and Vermeulen 2012) legitimise the social practice thereof, while Yeld (2011c) and Nel (2012) work as illustrative examples of how writers use various discursive strategies to delegitimise or critique the social practice of hydraulic fracturing.

Given that CDA stems from a social constructivist perspective, this study viewed discourses of hydraulic fracturing as being able to discursively and cognitively construct the natural environment. Subsequent to an analysis of the data, it can be said that writers draw on either neoliberal, capitalist ideologies or on environmentalist ideologies to discursively construct the natural environment in the context of hydraulic fracturing. The latter ideology is most apparent in texts where writers adopted an environmentalist stance, that is, one that valued nature for its own sake, while the former is more apparent in texts where writers were supportive of hydraulic fracturing, usually as a way to increase South Africa's energy supplies (Vermeulen 2012) or to generate economic profit more directly (Eggink 2011a). These findings were true regardless of the publications in which the texts appeared, or the year in which the texts were published.

In identifying dominant ideologies, the research aimed to highlight how the natural environment is entrenched in power relations and is in itself a product of politics, controlled

by powerful entities like media institutions, governments and MNCs. As a dominant participant in the practice of hydraulic fracturing, the power that MNCs like Shell have to control discourses on the issue is significant. Since the spread of globalisation, MNCs have provided and expanded employment opportunities, specifically for host nations (which tend to be less economically developed countries), and have provided economic growth for both home and host nations (Masden 2008: 4 & 10). Without the capital investment and economic growth that MNCs have brought and continue to bring to civilisation, knowledge and societal practices would not have been shared amongst countries and the standard of living would not have risen over the centuries (Masden 2008: 4-5 & 15). While MNCs are beneficial to society as a result of capital reinvestment, the rapid spread of power and globalisation has proven to be negative in nature (Masden 2008: 6). The concerns that arose as a reaction to globalisation are linked to the power that MNCs possess (Masden 2008: 6). Masden (2008: 7) expresses that “the power of capital is rapidly displacing political power” which, from this perspective, defines globalisation. It stipulates that MNCs control not only stakeholders but also the government. Thus, the power and influence of MNCs is becoming a larger part of the way in which society functions. This then poses a threat to society because of the potential for capitalism to be held in higher regard as opposed to society, and essentially, the environment.

The lack of responsibility taken by MNCs regarding its subsidiaries as a result of no single jurisdiction, and the great size of these corporations, prove that MNCs are the major polluters that lead to the degradation of the natural environment (Anderson 2002: 403). Many factors contribute to this such as a lack of policy and regulation implementation, lack of managerial supervision and poor decision-making (Anderson 2002: 403).

5.4 Recommendations for further research

Given the nature of this study as a mini-thesis, spacial limitations and time constraints affected the amount of articles that could be investigated and the ultimate conclusions that could be drawn. While Gee’s (1996) method of CDA proved to be an extremely useful tool for analysing media texts concerning hydraulic fracturing, an extensive analysis of more media texts would yield more interesting results regarding the similarities and contrasts between the texts. Since hydraulic fracturing is a topical issue which may have an enormous impact on the natural environment as well as society, research into the discourses of hydraulic fracturing in other texts, such as advertisements and academic articles, will reveal

interesting insights into dominant ideologies that legitimise hydraulic fracturing, or critique it.

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Appendix A

STAR

“Shell cites history to allay Karoo fears; Company claims fracking will not damage environment”, Pressly 2011a: 17

“It’s fracking profitable, but fraught with danger; Shell’s operation in Wyoming is an unlikely blueprint of what the Karoo can expect”, Ho 2011a: 13

“Shell may lose interest in fracking if delays continue”, Pressly 2011b: 5

“Shell doing its best to make fracking safe, water friendly”, Eggink 2011a: 14

“We need fracking to find out what’s there; Scientist calls for moratorium on process to be lifted for science”, Ho 2011b: 25

“Risk aversion key in fracking debate; Similar technology used in mining, official says”, Pressly 2012a: 23

“Authorities warm up to fracking as nuclear alternative”, Pressly 2012c: 15

“Geologist warns of pollution, earthquake risks of fracking”, Nkabinde 2012: 13

“Racial twist in debate on gas fracking in the Karoo; ‘White’s against, blacks for’”, Pressly 2012b: 8

CAPE ARGUS

“Shell chariman foresees SA fracking benefits”, Williams 2011: 15

“Shell pursues fracking bid; Opponent says energy giant ‘economical with the truth’”, Yeld 2011d: 8

“Minister omits key officials in fracking brief; Remarks dismay environmentalists”, Yeld 2011a: 8

“Public kept in the dark regarding progress of fracking team”, Yeld 2011b: 4

“Drakensberg and surrounds face fracking threat too, conservationists warn”, Yeld 2011c: 3

“Fracking concerns under scrutiny”, Yeld 2012: 6

“Why destroy Karoo riches for fracking’s short-term gains?”, Buirski 2012: 9

“Shell’s promise: we will make every drop count; The oil giant outlines commitment to Karoo”, Eggink 2012a: 17

“Fracking blamed for poverty not profit”, Louw, 2012: 20

MAIL & GUARDIAN

“Farmers say ‘no fracking way’ to Shell; Stage set for showdown over ‘misleading, biased, unprocedural and unconstitutional’ application”, Maclead 2011a: 14

“Fracking opens deep divisions”, Steyn 2011: 15

“Fracked if you do, fracked if you don’t; The Karoo saga is much ado about a golden opportunity for Shell, says its upstream manager”, Donnelly 2011: 4

“I’m not fracking celebrity”, Pugh 2012: 28

“A watchdog with strong bite; Not-for-profit organisations award Winner: Treasure Karoo Action Group”, Nel 2012: 15

“Fracking issues require new laws; Existing legislation does not address its legal, environmental and social ramifications”, Fig 2012: 36

“Fracking spin-offs trump concerns; The summary of a government report makes it clear what is favoured”, Donnelly 2012: 16

SUNDAY TIMES

“First blood to pro-frackers; But anti lobby warns it could trigger Karoo earthquakes”, Mashego 2011a: 4

“Karoo fracking: Shell details its plans; Finding water in the desert is a problem”, Eggink 2011b: 18

“Activists turn to court to see fracking reports”, Biyase 2011: 9

“Fracking can be worth billions; Moratorium on work in the Karoo is under fire”, Mashego 2011b: 13

“ANC trust stands to gain from fracking”, Jordan 2012: 3

“New technology of waterless fracking mooted for SA”, Prinsloo 2012: 13

“Karoo shale must be explored”, Vermeulen 2012: 13

“Fracking gets green light; Exploration set to start, but it may be nine years before Karoo gas flows”, Vollgraaff 2012: 1

Appendix B

STAR

Pressly 2011a: 17



1

ID: 03943747-01 Source Page: 17

Shell cites history to allay Karoo fears

■ Company claims fracking will not damage environment

Donwald Pressly

SHELL Oil Company, which has decades of experience in natural gas development in Alberta, Canada and in Texas, US, believes the procedure of drilling wells and using millions of gallons of water to extract shale gas in the karoo can be done without significant environmental damage.

It is also looking at, and piloting, other technology applications, including tight and shale gas fracturing which do not use water. One option is the use of liquefied petroleum gas (LPG). This effectively uses gas to extract gas.

One company that has spearheaded the use of gelled LPG in place of conventional fracturing fluids – water and various chemicals, which environmentalists are up in arms about – is GasFrac Energy Services. It also drills for gas in the US and Canada.

GasFrac believes that this process results in significant savings on material expenses and “fracture clean up”.

Returned from a recent round of public consultations in Graaff Reinet and Beaufort

West in the Karoo, Frederick Palmer, a senior communications manager for onshore gas for Shell, said the company had considerable experience in gas fracturing in Sublette County, Wyoming – a desert-like area like the Karoo – and contended that the procedure was done without significant damage to the environment.

It had also created new wealth in the region boosting revenues to Sublette County and boosting business and employment in towns such as Pinedale, Big Piney and Marbleton.

Environmentalist groups argue that gas has come out of water taps in Colorado following “fracking” – as the procedure is dubbed.

Palmer said in three instances of contamination of aquifers in this US state, two were the result of natural contamination by gas due to decomposition of organic material and the third case a combination of gas development and natural decomposition. None were examples of contamination by chemicals.

He backed up his argument with a report from the State of

Colorado Oil and Gas Conservation Commission, which found that a documentary – Gasland, which has created much antagonism to fracking at viewings in the Karoo – incorrectly attributed several cases of water well contamination in Colorado to oil and gas development.

Its investigations determined that “the wells in question contained biogenic methane that is not attributable to such development (fracking)”.

Hydraulic fracturing takes place thousands of metres below the earth, below underground aquifers. Well shafts were encased with cement and steel, so damage to the environment was prevented, Palmer said. Shell is interested in building 24 wells – eight each in three regions of the Karoo – should it get exploration rights.

On Friday, Mineral Resources Minister Susan Shabangu halted all applications for licences to prospect for shale gas in the Karoo. She said that given the intensity and scale of the issue “and the fact that this (shale gas exploration) has never been done before... my department will conduct a

comprehensive study which will assist us to formulate our approach after which we will go back to the cabinet”.

Until the conclusion of a feasibility study, no new applications will be accepted – nor will existing ones be finalised. This means that existing rights held by companies – including Shell – will be put on ice.

Palmer noted that Shell was planning over the long term. It was known that energy demand would be double that of the present by 2050 and it would require a mixture of fossil fuels – including shale gas – and renewables. He said moratoriums put in place did not constitute “a ban” but provided authorities with more time “to decide” on the appropriateness of hydraulic fracturing. To prevent environmental damage, “the design and execution of the wells is absolutely key”.

There was potential for vast job and wealth creation through shale gas development, he noted. In Louisiana in the US, \$10.6 billion (R69.1bn) in new business sales were generated in 2009 – in a recession year – while household income in the state climbed by almost \$6bn.



It's fracking profitable, but fraught with danger

Shell's operation in Wyoming is an unlikely blueprint of what the Karoo can expect

UFRIEDA HO

A SMARTPHONE snapshot is passed around, it's an image of the Karoo.

"Wow, it looks just like Pinedale," says one of the three American Shell Oil employees peering into the screen.

They're leading a group of South African reporters around the Wyoming basin where Shell has had a hydraulic fracturing operation for natural gas since 2001.

Shell has its eye trained on fracking in the Karoo, too.

Along with Falcon Oil & Gas, Anglo American, Bundu Gas and Oil and a joint venture between Sasol, Statoil of Norway and Chesapeake Energy of the US, they are waiting for the green light for their exploration licences.

But the similarities don't extend much beyond the likeness of the shrubs and the wide openness of the landscape. The semi-desert Karoo is not the Pinedale basin. The fracking operations here present an unlikely blueprint of what the Western Cape can expect if the moratorium on fracking is lifted.

The differences in South Africa are many: financial pressures, infrastructural constraints, climatic conditions, community sentiment, corporate cultures and legislative frameworks.

Shell's Pinedale asset in the Green River Basin stretches over 800km². Here the gas is in pockets, in the Karoo it's a continuous shale layer. There are 66 Shell employees here.

Contractors and downstream jobs make up other jobs, but it's not the thousands of jobs promised for the Karoo.

They work Shell's 400 gas wells in the largest gas fields in the US that's estimated to be able to supply 10 million homes for 30 years. Shell uses directional drilling on pads about the size of a double garage.

Each pad holds clusters of six or seven wells. These pads are dotted across the landscape.

Consolidated pads are meant to reduce disruption to the natural landscape and migration patterns of local wildlife.

Each well is drilled to about 4.3km with lubricants of diesel and fresh water – more than 20 million litres for each well. The well is encased at its upper regions, a measure to prevent ground water contamination.

But blow-outs can happen, leaks occur and groundwater does get contaminated. France has banned fracking, so has Quebec in Canada and New York and numerous counties across the US have fracking moratoriums.

After drilling a secondary

cylinder filled with explosives blasts holes through the casing, and the fracking fluids, sand and water are pumped at high pressure to break up the rock and create a conductive path for the gas to be released.

Keeley Balley, a Shell completions engineer, says the fluid is about 94 percent water and the rest is sand. The chemical additives, Shell says, amount to only 0.49 percent typical frack fluid. Balley says the chemical mix depends on pH, porosity and salinity. Chemicals are added for viscosity, protecting pipe corrosion and preventing the precipitation of metal oxides. Industry's frack fluid list includes acids, sodium chloride, ethylene glycol, isopropanol, polyacrylamide, guar gum and ammonium bisulfite. Their common applications are seemingly innocuous, including table salt, play sand, washing powder and make-up remover.

Most of the fluid is recovered during flowback from drilling, but some is left underground. Non-disclosure of the exact fracking fluid mix has resulted in enduring concerns that the fluids include cancer-causing chemicals.

Shell Pinedale has a water treatment facility that recovers condensate, an oil derivative,

Shell may lose interest in fracking if delays continue

Donwald Pressly

SHELL South Africa says if there are countless extensions of the moratorium on shale gas prospecting and ultimately exploration in the Karoo, it may lose interest in the project.

Upstream manager Jan Willem Eggink said if exploration did eventually occur, subject to evidence of sufficient shale gas supplies underground to make the exploration economically viable, it would only cover 1 percent of the area applied for in its licence application. It was envisaged that in five to 10 years, there would be 40 to 50 wells with a maximum of 32 well heads for a well pad. The well pad would be about 150m².

However, if Mineral Resources Minister Susan Shabangu endlessly extended the moratorium, interest in the project, and willingness to spend about \$200 million (R14m) during the exploration phase alone, would wane.

Speaking at the Cape Town Press Club yesterday, Eggink assured Karoo residents that the company would not compete with them for potable water supplies. Shell was committed to paying fair compensation to land-owners to gain access to their land.

The area under contention extends from Sutherland, some 200km from Cape Town, to beyond Hopetown in the Northern Cape, to Colesberg in the east, roughly 750km from Cape Town.

Responding to concerns that hydraulic fracturing, or fracking, would be detrimental to the aquifers in the semi-desert region, which extends for 230 000km² – 18 percent of South Africa's surface area or 52 percent of the Karoo – Eggink said: "We've made a clear pledge: we will not compete for water in the Karoo during any stage of our operations."

If the process of exploiting the resource was found to be viable, Shell

would bring the water it needed from elsewhere. "If we proceed with the development phase, we will by that time have a better view of where the water can be sourced from. In addition we will review other solutions, such as importing water from rivers outside the Karoo." He said this would probably initially be done by truck, but longer term plans could see water pipelines running to the wells.

Treasure the Karoo Action Group leader Jonathan Deal said there were examples in the US where Shell had damaged the environment, including water sources, during shale gas exploration, but Eggink said there were thousands of examples of fracking that did not cause damage.

One of the country's main energy problems was that 90 percent of electricity produced was generated from coal, "more than any other industrialised country", he said.

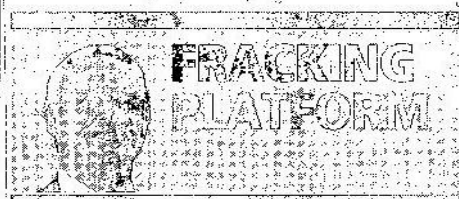
By drawing on potential, abundant domestic gas supplies which could be converted into electricity, "you can meet rising energy demand while maintaining energy security. Modern gas power plants generate up to 70 percent less CO₂ than an old-style coal-fired plant and are also cheaper to build." Because gas plants could be ramped up and down quickly "they make an ideal ally for intermittent energy sources like wind and solar".

Pressed on whether Shell expected to export gas, he said the government was likely to focus on the energy needs of the domestic market.

Shell planned to drill at least six wells in the first three-year licence period, which could be extended for two periods of two years. "These wells will inform us whether the gas can be extracted in sufficient quantities to be viable. If these show encouraging results, we will probably want to drill more exploration wells."

Eggink 2011a: 14

Shell doing its best to make fracking safe, water friendly



Jan-Willem Eggink

SOME of you may have seen this image on television or the internet. A man reaches across and turns on his kitchen tap. He takes a lighter and applies it to the stream of water; it bursts into flame. The flame is attributed to the presence of methane gas.

It is a powerful image. But it is important to be clear about the source of the gas. While critics suggest natural gas drilling as the cause, there is considerable evidence that dissolved methane can occur naturally in ground water. Indeed, according to the Department of Water Affairs, methane gas has been found in shallow water wells in the Karoo.

Confusion and misinformation about connection between natural gas drilling and water supplies feeds into public concern about the safety and environmental impact of shale gas production, and contributes to worries about the exploration for natural gas in the Karoo. The public is right to demand high standards.

For the industry, there are two clear tasks at hand: first, we must continue to maintain the very highest operational standards. At Shell, our efforts are underlined by a set of global onshore shale gas operating principles that provide a framework for protecting water, air, wildlife and the needs of local communities.

We support regulation that is designed to reduce risks to the environment and keep those living near our operations safe.

Second, we need to dispel the significant misconceptions about shale gas production. I would like to address the main misconceptions about shale gas, underlined by the fact that shale gas under the Karoo may help South Africa to develop a secure and sustainable energy supply

We understand that people have concerns about the issues and allegations raised by opponents of shale gas extraction, and we feel it is important to address these. The allegations have many factual discrepancies and do not reflect Shell's operations.

One major misconception is that hydraulic fracturing poses a significant risk to fresh water aquifers. A very recent report of the US Energy Department that has been looking at potential health and environmental implications of hydraulic fracturing confirmed that when a well was designed and constructed correctly, ground water would not be contaminated. We think we need well-targeted and strictly implemented regulation to preserve public con-

fidence that the shale gas revolution really is a force for good.

We believe that protecting fresh water aquifers is not difficult: the natural gas in some cases lies thousands of metres below aquifers. So it is virtually impossible for liquid or indeed gas, to reach drinking water.

Nevertheless, we follow strict standards to ensure that wells are constructed correctly. We line our wells with multiple steel and concrete barriers to prevent gas or liquid from leaking out of the well itself.

I should highlight that fracking has been successfully performed more than a million times in the US alone over the past 60 years in vertical wells and more than 20 years in horizontal wells. We do not hydraulically fracture wells unless we have pressure tested the well bore for integrity.

Another criticism relates to water consumption and use. According to various studies, including one by the renowned Massachusetts Institute of Technology in the US, the water intensity of shale gas ranks among the lowest of all energy sources. We recognise that in an arid area like the Karoo, even limited water use may be a concern. Again, sound operational practices can address these concerns. Shell strives to avoid competing with local water needs. We will not operate wells where isolation of our completion and production activities from potable ground water cannot be achieved. And wherever possible, we use non-potable water, including the recycling and reusing of water from our operations. Nobody will go short of fresh water

because of our operations; either in the exploration phase, or if there is any further development. This is a legally binding commitment.

One example of how we work with communities to find the best solutions for the water use is in China's Shanxi province. Here we are developing the Changbei field, we funded the construction of 240 underground water-storage tanks and 12 water-pumping stations, providing about 3 000 people better access to drinking water.

A third debate results partly from a paper by Cornell University, which stoked fears that greenhouse emissions from shale gas far exceeded not only those from conventional gas, but even those from coal.

While we agree emissions from all energy sources need to be better understood, the quickest and cheapest way to reduce emissions is to switch power generation from coal to gas.

The assumptions made in the Cornell paper stand in stark contrast to the International Energy Agency (IEA) analysis, which found that, on a well to burner basis, emissions from shale gas exceed those of conventional gas by as little as 3.5 percent in the best case scenario and by 12 percent in the worst. Rigorous operations management helps to get to the lower number. The IEA stated: "...total emissions from (shale gas) production are only slightly higher

than for conventional gas; and both the water and climate impacts can be mitigated using existing techniques".

A conclusion recently backed up by a research paper from Carnegie Mellon. In any event, shale gas-fired power still emits only about half the CO₂ of coal-fired power, which was confirmed in the US National Energy Technology Laboratory study comparing newest gas and coal technology.

Some people disagree about how South Africa should meet its energy needs in the future. We want to promote debate and have a solid discussion based on facts and not on misconceptions.

At Shell we believe onshore exploration and production can and must occur in an environmentally responsible manner. Anything less is unacceptable. I know that this won't convince everybody.



1

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Source Page: 14

And we can never have all the answers, but our exploration activities will provide a large amount of answers to the question, whether the gas is there and can be produced commercially. We're determined to be transparent and open about our proposals, and to address all concerns.

Eggink is the upstream general manager for Shell in South Africa.



'We need fracking to find out what's there'

Scientist calls for moratorium on process to be lifted for science

UFRIEDA HO

TWO American universities, two scientists with two sets of calculations and two views on fracking. And that's the point.

Geohydrologist Dr Danie Vermeulen of the University of Free State says our SA situation is not far off from the one which the University of Pittsburgh and Pennsylvania State University are wrangling over with their conflicting views on just how much shale gas lies in the Marcellus rock formation in the US.

Vermeulen, along with his Institute for Groundwater Studies colleague Gerrit van Tonder, addressed the last of this year's Wits Origins Centre speaker series at the end of last month.

Vermeulen spent three weeks as a guest lecturer in Minnesota recently and visited the Marcellus shale reserves while he was abroad.

He's returned to SA with the opinion that the extended moratorium on fracking, in place in SA till February, should be lifted for scientific research.

"Right now we simply don't know what there is in the Karoo, even though we've been graded as having one of the top five gas reserves in the world," said Vermeulen.

He believes exploration wells will make little impact on the landscape and the environment.

"Six wells are not going to destroy the Karoo but it will give scientists a better idea of what we actually have underground and what conditions we are dealing with."

But any kind of drilling has been slammed by anti-frackers.

The Treasure the Karoo Action Group (TKAG) has said it will continue to use all legal means to block any government decision to proceed with exploratory drilling once the moratorium period is up.

This comes as Sasol announced that it has suspended its exploration plans for fracking in the Karoo basin for the time being. Sasol was one of a number of companies looking to frack in the 90 000km site.

Others include Shell, Bundu Gas and Oil and Falcon Oil & Gas.

Having grown up in the Karoo, Vermeulen says he's a "farm boy at heart" who understands the connection to the land and the Karoo in particular.

At the same time though Vermeulen, who works with groundwater studies at coal mines, says all forms of energy, including renewables, do cause harm and don't necessarily tick the aesthetics box either.

"It doesn't matter what we use, we can harm the environment," he said.

He maintains fracking will inevitably be part of the energy mix in the next few decades.

We simply don't know what there is in the Karoo

Already Planning Minister Trevor Manuel's development plan has included fracking as a potential energy source for the country.

"If gas reserves are proven and environmental concerns alleviated, then development of these resources and gas-to-power projects will be fast-tracked," the NPC's national development plan states.

It's an announcement that has been met with criticism by anti-fracking activists.

Fracking will be continuing down the path of non-renewable, monopolised energy resources, say activists. The precautionary principle must apply, say activists, who believe the fracking cons outweigh the pros.

Vermeulen's presentation relies heavily on industry's own statistics.

He also acknowledges that the American situation is not directly applicable to SA conditions.

His biggest concern for SA is the fact that even though fracking would use comparatively less water than say a coal mine, it would still require 15 000m³ (about six Olympic-sized pools) of water for one fracking well.

In the absence of infrastructure, trucks will be used to bring in the water, equipment and personnel needed to drill up to 4km underground. This means pressure on roads, risks for air pollution, water contamination and negative impacts on the social order and cohesion of small, rural communities.

Vermeulen insists that fracking has become inherently safer in recent years, given new fracking techniques and the fact that industry in the US has learnt from mishaps and accidents where and when they have occurred.

But Vermeulen still errs on the side of caution. He has a caveat for exploratory fracking to proceed and this is that stringent protection policies for people and the planet have to be in place.

"If we don't have an independent policy in place then I do say no way can we frack, not even for scientific research," said Vermeulen.

He says to move forward there needs to be a working team with muscle and it has to be guided by wide



1

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Source Page: 25

ranging views and inputs.

"We need a stronger working team, we don't have fracking experts in this country, but we do have other experts and we should be using them better.

"The task team is a political thing, but the working team should be a group that is free from politics and brings in all points of view," he said.

Vermeulen says fracking is a long was off as an energy option for SA.

But decisions are being made now, and it just remains to be seen whose agenda will win the day.



Risk aversion key in fracking debate

■ Similar technology used in mining, official says

Donwald Pressly

AN INSIGHT into whether or not the government will support shale gas exploration in the Karoo was provided during a discussion on the National Development Plan in the portfolio committee on water and environmental affairs yesterday.

The committee, chaired by ANC MP Johnny de Lange, was discussing the pursuance of a low carbon economy by the National Planning Commission, under the political leadership of Minister in the Presidency Trevor Manuel, when Environmental Affairs Department chief operations officer Lize McCourt acknowledged that there was a "heated debate" over fracking.

Referring to hydraulic fracturing, a process of injecting water and chemicals under high pressure way below the earth's surface to extract shale gas, she said it would only be "a better option" – in regards to climate change – if it replaced a more carbon-intensive fuel like coal. "It is more carbon intensive than nuclear (fuel), but it is less so than coal."

It could make a contribution to satisfying South Africa's energy needs and also be better for the environment if it did "replace

coal in terms of energy needs".

McCourt noted that "a fracking-like technology" was already being used in the country in coal and gold mining operations. "Our argument is that exploration could continue if a risk averse approach has been followed."

McCourt, noting the damage to aquifers in some areas as a consequence of mining and the high levels of acid mine drainage, said it was incumbent on operators of hydraulic fracturing technology to conduct operations in a manner that was environmentally sensitive. She said the technology used should not undermine the aquifers in the Karoo in the same way as elsewhere.

Former Western Cape MEC and now a national planning commissioner Tasneem Essop acknowledged that many of the plans – including energy use – in the draft National Development Plan were a work in progress. She pointed out too that the commission was not a delivery mechanism but rather an advisory one. The government and departments were the delivery agents and they would have to be persuaded by the commission's proposals.

She said it was unclear at this stage whether the planning commission would involve itself in

the detailed planning of how to achieve a low carbon economy. She did say, however, that the commission believed that if there was to be exploration to exploit methane and shale gas reserves, it would need to be carried out by environmentally sustainable technology.

While steps should be taken to reduce carbon emissions in the supply of electricity, Essop said the commission had proposed the transfer of Eskom's planning, power procurement and purchasing functions to an independent systems operator while the costs and benefits of "the nuclear option" needed to be evaluated.

DA environment spokesman Gareth Morgan said it appeared to be a case of the cart being placed before the horse as far as sustainable use of water was concerned. He wondered whether the plans for the coal-fired power station Kusile, the nuclear plants and hydraulic fracturing were put in place before "and then we (government) say we will put the necessary augmentation plants to get water there".

He said he knew that the Medupi coal-fired power station was guaranteed its required water, while surrounding farmers in the area were guaranteed far lower provisions.



Authorities warm up to fracking as nuclear alternative

Donwald Pressly

IN ANOTHER signal that South African authorities are warming to the need to exploit local reserves of shale gas, the National Planning Commission said yesterday that it saw natural gas providing "a rising share" of the energy mix because it was likely to be cheaper than exploring nuclear power options.

It warned, however, that steps had to be taken to ensure that environmental safeguards were firmly put in place.

The commission, which is an advisory body to the South African government, also believes that South Africa's abundance of coal sources means that this form of energy cannot be ignored in the future, but argues that it should be exploited as efficiently and cleanly as possible.

Addressing a briefing of MPs on the National Development Plan piloted by Planning Minister Trevor Manuel, the head of his office, Kuben Naidoo, said that while no target had been set for gas supply, the ministry was "mindful of the environmental and safety risks associated with hydraulic fracturing".

Hydraulic fracturing is a controversial process to extract gas from beneath the earth.

A number of companies want to explore for shale gas in the greater Karoo area of the Western Cape and Northern Cape, including Shell, Bundu Oil & Gas and Falcon Oil & Gas.

Earlier this week Mineral Resources Minister Susan Shabangu said an inter-ministerial task team probing the potential exploitation of shale gas, which is dubbed fracking mainly by its opponents, would be presented to the cabinet shortly.

Shabangu was answering questions outside a meeting of the National Assembly's mineral resources committee.

She said that once the report went to the cabinet the committee would debate the matter further. She confirmed that the issue of the lifting of the moratorium on exploration for shale gas would be contained in the report to the cabinet. It is understood that this is an indication that the moratorium, which was imposed early last year and extended again in August for six months to the end of February, effectively remains in place until it is lifted.

MPs asked Naidoo what was inhibiting South Africa from exploiting solar energy, particularly when one realised that a country like Germany was producing high volumes of it in

a cold climate, but sunny South Africa was far behind in deploying solar technology.

Naidoo noted that it was envisaged by the integrated resource plan that South Africa needed to increase its power

generation capacity by 40 000 megawatts, about double the current levels, within 20 years. Some 20 000MW of this "must come from renewables", which included a little hydro-electric power, gas and about

9 600MW of power from nuclear energy.

"We think we should explore our own gas resources. We think gas might be cheaper than nuclear (power)."

He said recent natural gas finds off Mozambique had been "very significant... so we are taking a regional approach to energy, especially lower carbon dioxide-emitting energy (sources)." – *Additional reporting by Shanti Aboobaker*



Geologist warns of pollution, earthquake risks of fracking

Sungula Nkabinde

RENOWNED geologist Chris Hartnady has resurrected concerns that Econometrix, the country's largest independent macroeconomic consultancy, underplayed environmental consequences in its assessment of the potential macroeconomic benefits of hydraulic fracturing, or fracking, to extract gas in the Karoo.

The report, released earlier this month, estimated that 485 trillion cubic feet (tcf) of shale gas could be lurking in the Karoo – described as being equivalent to 400 years of oil consumption in South Africa.

Bonang Mohale, the chairman of Shell South Africa,

which commissioned the report, said the findings were “bigger than the discovery of gold in Gauteng”.

The anti-fracking coalition Treasure the Karoo Action Group (TKAG) dismissed the 73-page report as “poorly researched in respect of the holistic facts on shale gas mining”, “lacking in substance” and ignoring social costs.

Speaking at the Shale Gas Southern Africa conference in Cape Town yesterday, Hartnady presented a case against shale gas development, arguing that the environmental impacts and geophysical risks of fracking were too costly.

He warned that the reassuring figures of available gas in

the Karoo might be scaled back if the gas resource assessment of the Marcellus shale deposits in Pennsylvania and Ohio in the US was anything to go by.

“An original 2009 estimate of 489tcf, closely comparable to the Karoo estimate... has now been reduced to between 84tcf and 43tcf by the US Geological Survey, depending on the confidence level (50 percent or 95 percent, respectively) assigned to the estimate.”

In terms of damage to the environment, Andrew Venter, the chief executive of the Wildlands Conservation Trust, was also wary of the Econometrix estimates. “There is no doubt that Shell and its fracking allies are determined to persevere

despite the concerns that have been raised... This is understandable, and it would be shortsighted for us to forego the associated economic opportunities (of fracking).

“However, there is significant doubt as to the realistic scale of this impact. The Econometrix report has been widely criticised as not only being biased (but) also unrealistic in its projections,” he said.

Hartnady said the exploration would lead to landscape degradation through the industrialisation of the rural habitat and noise pollution. More damaging to the country's plight was that it would deplete the dwindling water supply.

The exploration phase in

three areas of the Karoo would require 48 000 to 216 000 cubic metres of water to drill 24 wells and, should exploration be successful, actual gas production was likely to require about 10 000 wells.

“Shale gas production would become a serious competitor for water, requiring as much as four times the current annual usage of the groundwater in all three of the Shell exploration areas,” he said.

Surface water can be contaminated through improper disposal of recycled water, and groundwater could be contaminated due to fracking fluids being injected into rocks during the fracking process. In extreme cases in the US, this

has led to flammable tap water.

Hartnady said fracking would be likely to increase the incidence of earthquakes. Referring to the 5.6 magnitude Oklahoma earthquake in 2011, he said the state previously experienced around 30 small earthquakes a year; a number which, since 2010, had soared to over 1 000 a year.

“The 2011 ‘hydroseismic’ events in Oklahoma and Ohio bear important lessons for the Karoo, especially since – though not common knowledge – significant earthquake activity is established in this part of the country. The earthquake catalogue of South Africa shows many epicentres with r. and around the Karoo,” he said.



Racial twist in debate on gas fracking in the Karoo

■ 'Whites against, blacks for'

Donwald Pressly

THE DEBATE about hydraulic fracturing had turned racial as wealthy whites wanted to maintain their pristine environment in the Karoo and the region's mostly poor black community lived in the hope of development and jobs from the process, the Karoo Shale Gas Community Forum said this week.

Addressing the Cape Town Press Club where activists from the forum debated, spokesman Chris Nissen agreed with community activist Ralph Stander, who said it seemed that in general, whites wanted to prevent drilling for shale gas but most poor black people backed it.

Noting that the forum had branches in major Karoo towns where extraction was likely, including Graaff Reinet, Oudtshoorn and Beaufort West, he said community meetings were representative of the voices of the people. "The majority of black people, both coloured and African, want to know more about the project, the economic benefits and what it is going to mean for their lives."

Nissen agreed that human life was cheap in the Karoo. "If you murder someone you get five years (in jail), but if you steal a sheep you get 20 years," he said.

The majority of whites, "mostly landowners", argued about protecting "the landscape" of the Karoo, Nissen said, and were concerned about environmental issues such as the scarcity of water and the potential pollution.

When one member of the audience, Jeremy Taylor of grey water recycling company Water Rhapsody, pointed to the potential contamination of water resources in the Karoo, Nissen said that former Water Affairs director-general Mike Muller had indicated that the Laingsburg aquifer, for example, did

not provide suitable water for drinking or farming.

"The aquifers are useless for crops," he said.

Taylor also objected to the ANC's indirect interest in Royal Dutch Shell - the principal company interested in extracting gas - while being "a player in the industry, judge, adjudicator and executioner".

Nissen said it was a reality that the ANC governed and it was the practice in many countries that political parties had

business interests as long as transparency prevailed. Pressed on whether he had any financial interest in Shell, Nissen said he had none whatsoever.

He argued that it was important that the feedstocks of the industry would use the rail system, which would take traffic

off the roads and trigger the now defunct freight rail lines back into life. He was referring to the potential supply of water and chemicals used in the hydraulic fracturing procedure to extract the shale gas.

Nissen said it was key to set up a monitoring body of experts who would ensure that the process of hydraulic fracturing was carried out with the care the environment needed. "What we believe is that there should be a balanced approach... prospecting for gas in the Karoo should be responsible and sustainable... keeping the people and the environment together."

Lorna Levy, who said she was an ordinary ANC member,

said the fracking issue "should not be racialised". The concerns about the environment needed to be balanced against the need to explore the economic benefits of the process.

While Mineral Resources Minister Susan Shabangu has promised that the cabinet will take a decision on a fracking task team report in July, Energy Minister Dipuo Peters has expressed support for it, noting that Africa was entering "a golden age" of gas extraction.

CAPE ARGUS

Williams 2011: 15



1

ID: 03965704-01 Source Page: 15

Shell chairman foresees SA fracking benefits

ENVIRONMENTAL activists, Karoo residents and many other people have harsh words for three companies - Shell, Falcon Oil and Bundu Oil and Gas - that plan to search for gas in that area.

Today, we give Shell's country chairman, Bonang Mohale, an opportunity to respond, and to present the company's case:

Many people have made a powerful appeal against fracking in the Karoo. Is opposition well intentioned, but over-emotional and misguided?

We appreciate that the exploration and potential development of natural gas in the Karoo is an emotional and personal issue for many, and we don't take this lightly.

If it is decided that the exploration licences are in the best interest of better assessing South Africa's energy and economic future, we feel there is no one better than Shell to execute these licences, in a transparent manner.

If the Environmental Management Plan (EMP) is approved - this is the phase of the exploration licence we are currently in - separate environmental impact assessments would have to be completed before the first exploration well would be drilled.

South Africa's natural resources have given this country much of its wealth. But times have changed, and there is now



MURRAY
WILLIAMS

The Friday Grill

an acute awareness of the environment. Are you listening to other independent experts?

We will create collaborative approaches with stakeholders, ensuring that experts and communities have a seat at the table, to understand and manage challenging issues such as water and footprint. We have committed to set up an independent advisory committee and citizen advisory groups to provide expert advice on environmental and social impacts, including the use of hydraulic fracturing and our use of water.

We will commission an independent study in our licence area of water resources using third-party experts to ensure that we get a bet-

ter understanding, also providing information that may be useful in the development of water supplies for the region.

Are poor people vulnerable to the benefits of short-term employment, as promised by Shell, even if there are negative long-term consequences? Are you exploiting this?

During the exploration phase much of the work conducted requires specific skills, so the job opportunities may be limited.

However, we will endeavour to source products and services from local parties during the exploration phase.

Shell is looking for a significant contribution from local suppliers and manpower during all phases of the project, given they meet our safety, technical and economic criteria.

We do not agree there will be long-term negative consequences. Should the exploration phase prove successful, then we will look at ways to develop local capacity.

Are lobby groups who oppose fracking in the Karoo using enough of their considerable intellectual capital to develop alternate ways of creating more jobs in the Karoo?

We believe it's not just about job creation in the Karoo, but also about energy security for the people of South Africa. Some NGOs have

suggested investment in renewable energy, which could create job opportunities.

The world is shifting towards a new low-carbon energy future. It is not a matter of gas or renewables, but of gas and renewables. But to reach it, governments, industry and customers must work together.

The energy transition will take time and fossil fuels will continue to provide the bulk of energy.

The government, through its proxy, the state mining company, has applied for a great number of mining permissions in deeply inappropriate areas. Has the government abandoned the progressive foundations on which the constitution was laid?

One needs to balance the need for energy, jobs and environmental conservation. We are confident of the government's ability to do so within the legal framework.

Do you believe some approvals are in pursuit of kickbacks?

No, but the government is aware that mitigation actions in the energy sector is key to achieving South Africa's reduction targets given the sector accounts for over 80 percent of the country's emissions. Therefore, diversification of the energy mix is required and natural gas could be instrumental both in meeting growing energy demand and contributing to these emissions reductions targets.

Shell pursues fracking bid

Opponent says energy giant 'economical with the truth'

JOHN YELD

Environment & Science Writer

ENERGY giant Shell has told the anti-fracking lobby that it intends to "vigorously" continue with its exploration plans for shale gas in the Karoo despite the moratorium on fracking that has been imposed by the government pending a full scientific inquiry.

This is according to the Treasure the Karoo Action Group, which accuses the multinational of "being economical with the truth" about the impacts of fracking.

Fracking is a form of exploitation of shale gas found several kilometres underground. It involves fracturing the rock that contains it, by



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Each SMS costs R1

injecting a mixture of water, sand and chemical additives at high pressure to free the gas.

The action group called a media conference yesterday, partly to respond to what it said were incorrect claims about the economic and social benefits of fracking made by pro-fracking speakers in a public debate hosted by the Johannesburg press club last week.

At the media conference, action group spokesman Jonathan Deal also accused Shell of running a significant pro-fracking media campaign that

"virtually borders on propaganda at times", and that was "built on a foundation of untruthfulness".

He also said the action group's attorneys had filed a detailed complaint with the Advertising Standards Authority about full-page newspaper advertisements placed by Shell immediately after the government's moratorium was announced. These were now under investigation by the agency for allegedly being "misleading and untruthful".

The action group had been concerned to discover recently that Shell had developed and distributed questionnaires about fracking to schools in the Karoo, despite the moratorium. These contained "very

cleverly worded" questions about fracking, designed to familiarise people with this technique, Deal said.

It was "certainly an attempt to influence local communities", and a "well-known marketing tactic" to target households through children.

Deal referred specifically to a claim by Bonang Mohale, chairman of Shell South Africa and vice-president of Shell Oil Products Africa (South), during a recent Cape Town debate, that none of the 800 000 wells owned, managed and drilled by Shell in 60 years had collapsed or caused groundwater contamination.

But Deal pointed to an American hydraulic drilling company, East Resources

Management, that, he said, had notched up more than 100 environmental violations before being acquired by Shell in May last year, and six since then - two of which had been self-reported.

A report on one of these violations stated: "Unpermitted discharge of residual waste. Pollutational (sic) substances at well site impacted groundwater. Seep expressed itself in sedimentary basin. Elevated chloride, barium, strontium and sodium concentrations in seep."

Deal said: "Treasure the Karoo Action Group did not construct this (the environmental violations). It's a matter of public record."

While the energy company's pro-fracking campaign could

be described as "misleading", he added: "I'm going to take the latitude and call it plain dishonest."

Deal also pointed out that fracking was about to take

place in Pilanesberg - although not the same form of fracking that energy companies used to extract shale gas - and said these companies were also eyeing places in KwaZulu-Natal

and Mpumalanga. So it was no longer just an issue of concern for Karoo communities.

"It is of national interest to this country."

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Minister omits key officials in fracking brief

Remarks dismay environmentalists

JOHN YELD

Environment & Science Writer

THE GOVERNMENT task team appointed to investigate the controversial practice of hydraulic fracturing, or fracking, for shale gas in the Karoo appears not to include any environmental experts or officials from the departments of water and environmental affairs.

This is apparent from remarks by Mineral Resources Minister Susan Shabangu at a media briefing this week, ahead of her budget speech on Wednesday.

The omission has disappointed environmentalists, who say the big concern about fracking is precisely its environmental impact.

And they are also concerned that the task team's investigation is being hurried because, despite assurances that a cabinet-approved moratorium on fracking is in place, this has not been officially gazetted and is therefore not technically legal.

Shabangu said the task team would report back to the cabinet by the end of July.

In terms of the Mineral and Petroleum Resources Development Act, the minister must

decide on an application for an exploration permit within 120 days of the applicant submitting an environmental management plan, if all requirements are met. In Shell's case – and assuming the department believes it has complied – this will be by mid-August.

The opposition DA, which has posed as yet unanswered parliamentary questions about the task team, says if water and environmental affairs officials are excluded, then the team is "fatally flawed".

"In particular, the Environmental Affairs Department is a player in gas exploration proposals as the actual ELAs (environmental impact assessments) for the drill sites are a competency of this department, despite the environmental management plan being a competency of the Mineral Resources Department," said DA environment spokesman Gareth Morgan.

"Further, the availability of water and the potential for water pollution are arguably the most important considerations when deciding on gas exploration proposals, so the Water Affairs Department has an obvious role to play."

In the prepared copy of her

budget speech, Shabangu said she had appointed a task team "of senior government officials", led by her department, to conduct further research on "these crucial issues" and to help formulate a policy.

Earlier, in answer to a question at the briefing about the task team, she said it comprised officials from her department, the Petroleum Agency of SA which is assessing Shell's application, and from the departments of science and technology and of trade and industry. She raised eyebrows by not mentioning the departments of water and environmental affairs.

When the Cape Argus later asked department spokesman Bheki Kumalo for details of the task team, he would say only that it had met for the first time last week. He declined to name its members. He also said he expected the minister would announce its composition later.

Melissa Fourie, executive director of the Centre for Environmental Rights, said the apparent absence of environmental experts from the task team was "of great concern".

● *Additional reporting by Donwald Pressly.*

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Public kept in the dark regarding progress of fracking team

JOHN YELD

Environment & Science Writer

THE DEPARTMENT of Minerals and Energy is keeping mum about how the task team established to investigate proposed fracking is progressing.

When the minister, Susan Shabangu, set up the team that was to make policy recommendations for this controversial method of exploiting shale gas in the Karoo and elsewhere, she announced that it would complete its work and submit a report by the end of last month. This report was to be considered by the cabinet this month.

This appears not to have happened, and the department

has not responded to questions put to it by the Cape Argus last week about the task team's progress.

Also, the department has not acknowledged or responded to a formal request, submitted by the Cape Argus under the Promotion of Access to Information Act (PAIA) in mid-June, for full details of the task team and its terms of reference.

Under the act, the department should have responded within 30 days.

Not only has there been no response, but a copy of the application that was sent by registered mail to the department's information officer -

designated in terms of the act - at the address listed on the government's official website was returned to sender by the post office after being uncollected for 30 days.

The PAIA application was faxed to the department at its Cape Town and Pretoria offices and transmission records show this was done successfully on both occasions.

Under the act, if an application is not responded to within the time limit, it is deemed to have been refused. The Cape Argus has now submitted an internal appeal, also in terms of the act, against this deemed refusal.

The DA, which has also

been seeking information about the task team, has had more success, with Shabangu partially answering its parliamentary question recently.

She said in response to the DA's Gareth Morgan that the task team was chaired by outgoing director-general in the department Sandile Nogxina.

Its members were the deputy directors-general of her department, as well as science and technology, and of trade and industry, along with the chief executive of the Petroleum Agency of SA (Pasa), which was responsible for processing applications for prospecting, like that of Shell, for shale gas in the Karoo, Sha-

bangu said.

The task team was being assisted by a working group of representatives from the Council for Geosciences, the CSIR and Pasa, all nominated by the respective department heads.

"Public interest issues, including concerns raised by interested and affected parties during the consultation processes of the applicants, shall be taken into account by the task team. It shall thus not be necessary to subject the outcomes to further peer review and public commentary."

But Shabangu's answer did not satisfy Morgan, who has asked a follow-up parliamentary question.

He wants to know, among other things, the names and designations of all individuals from Pasa, the Council for Geosciences and the CSIR who have done work for the task team. He has also asked "whether, with reference to the moratorium on gas exploration licences where fracking is proposed, as announced in a cabinet media release on April 21, the moratorium was published in a Government Gazette. If so, in which gazette; if not, why not?"

Shabangu is to address the Cape Town Press Club on Thursday, where she may provide more information.

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Drakensberg and surrounds face fracking threat too, conservationists warn

JOHN YELD

Environment & Science Writer

WHILE proposed fracking for shale gas in the Karoo has drawn most of the local criticism of this controversial extraction method, there is an equally serious threat to the Drakensberg and surrounding mountainous areas in three provinces, conservationists are warning.

And a similar warning about the dangers of mining and oil-and-gas exploration and exploitation elsewhere in Africa has come from the Interna-

tional Union for Conservation of Nature (IUCN), which says one in four of the continent's "iconic natural areas" are threatened by planned mining and oil-and-gas projects.

The IUCN, which advises the UN Educational, Scientific and Cultural Organisation (Unesco) on World Heritage Sites in the "natural site" category, recently expressed concern about the "rapidly increasing number of cases" where sites were threatened by such projects, although it acknowledged that some major players had agreed to not

exploit these areas.

Barkly East conservationist Kate Nelson, who runs a local guest farm and adventure company, said that while many people knew of the active anti-fracking campaign being run in respect of shale gas prospecting applications there, few were aware that large parts of

the Free State, Eastern Cape Highlands and KwaZulu-Natal were under a similar threat.

Prospecting permits had been granted to Anglo Coal and to a three-company consortium consisting of Sasol and foreign energy giants Statoil and

Chesapeake Energy, covering an 88 000km² tract of land right around Lesotho – including the central and southern Drakensberg regions of KwaZulu-Natal, the Eastern Free State and the Eastern Cape Highlands.

The consortium, granted a one-year technical co-operation permit in November last year, was involved in a desktop exploration study which did not involve any drilling at this stage, Nelson said.

"Nevertheless, it is a situation that local residents need to monitor closely."

The exploration permits

had been granted despite the Drakensberg being one of the country's top tourist attractions and a proclaimed World Heritage Site.

The uKhahlamba-Drakensberg Park was added to the World Heritage List in November 2000, to help conserve both its natural scenic beauty and biodiversity, and its rich cultural heritage in the form of San rock art.

The Berg was also a highly productive agricultural area and a vital source of clean water for large parts of the country.

"The Drakensberg is South Africa's major watershed, with tributaries supplying both the Atlantic and Indian Oceans. Any pollution of this region therefore has the potential to impact on very large parts of the country's water supply," Nelson said.

"The fact that the Berg does have water potentially makes it more attractive for fracking than the 'Karoo Heartland', and so it is potentially more viable for the oil-and-gas exploration companies."

Nelson said local conservationists had raised their con-

cerns with the IUCN because the uKhahlamba-Drakensberg Park appears to be within the approved prospecting region. "We are eagerly awaiting their response."

In June, Tim Badman, director of the IUCN's World Heritage Programme, described these heritage sites as "exceptional places" covering less than 1 percent of the Earth's surface.

"They have been included on the World Heritage List because they are of outstanding value to all of humanity. It's the duty of every one of us to co-

operate in their protection and conservation.

"That duty includes the extractive industry."

He acknowledged that some energy companies like Shell and the financial services firm JP Morgan, as well as the International Council on Mining and Metals, which brings together many of the world's major mining companies, had recognised the importance of conserving World Heritage Sites and had committed themselves to avoiding any activities that would damage them.

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Fracking concerns under scrutiny

JOHN YELD

Environment & Science Writer

THERE are "serious concerns" about hydraulic fracturing, or fracking, in the Karoo environment, the Department of Water Affairs has warned.

The warning is contained in an e-mail that is among a bunch attached to the answering affidavit of mineral resources director-general Thibedi Ramontja, filed in the Pretoria High Court this week.

Ramontja was responding to an application brought under the Promotion of Access to Information Act (Paia) by anti-fracking coalition Treasure the Karoo Action Group, in an attempt to force the government to reveal details of the fracking task team appointed by Mineral Resources Minister Susan Shabangu in May.

Ramontja's affidavit states the task team is chaired by himself and includes representatives of his department and those of energy, science and technology, environmental affairs, water affairs, economic development and trade and industry, as well as from the Petroleum Agency of SA (Pasa).

The task team in turn appointed a working group consisting of representatives of Pasa, the Council for Geosciences, the CSIR, and the Department of Water Affairs.

One of the members of the working group is Dr Eddy van Wyk of the Water Affairs Department's hydrological services.

In a mail appealing for a proposed August 12 meeting to be postponed for a week, Van Wyk states that Dr Danie Vermeulen of the Institute for Groundwater Studies at Free State University – one of the reviewers of the working group's interim report – had recently visited shale drilling and fracking operations in Pennsylvania in the US.

"I would like him to give his opinion on the SA

case to the working group. I had a long discussion with him on Friday last week, as well as his colleague, Professor Gideon Steyl, who accompanied him on the Pennsylvania mission.

"I would like to state this firmly: there are serious issues for the Department of Water Affairs (DWA) as to hydrofracking in the Karoo environment – especially with reference to DWA's Water Act, section 21 (f). We should now start with negotiations on the way forward."

Section 21 (f) refers to the discharging of waste or water containing waste into a water resource through a pipe, canal or other conduit.

From other correspondence, it appears the working group's interim report was reviewed by Vermeulen and by Professor Yongxin Xu, professor of hydrology in the department of earth sciences at UWC. Their reviews were due to be discussed by the task team at a meeting on January 17.

The e-mails also reveal that Pasa sent a group to the US to investigate fracking, and that the Water Affairs Department wanted to arrange a similar visit, "but focusing on the environmental requirements for hydrofracking in SA".

The mails do not state whether this latter visit took place.

According to the task team's original terms of reference, it was to issue an interim report by June 30 and a final report by July 31 last year.

The e-mails indicate that in mid-August, Shabangu asked for a progress report by the task team, and indicated that she wanted to extend the moratorium for six months.

She has extended the moratorium until the end of this month, although it is not clear whether that is legal as it was apparently not gazetted.

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Criteria

THE FRACKING Task Team, according to its official Terms of Reference, is investigating:

- The technical aspects of fracking (hydraulic fracturing) for conventional petroleum, coalbed methane and shale.
- The possible environmental and social implications of fracking and related activities, including but not limited to land use, water use, water pollution or aquifer contamination, and noise and dust pollution.
- Any shortfalls or omissions in the existing regulatory framework relating to fracking.
- The estimates of the unexplored hydrocarbon resource and any constraints on these.
- The implications for SA's energy security.
- The economic implications of either a ban, moratorium or stringent environmental regulatory measures on fracking.
- Infrastructure and market limitations for gas and its effect on the viability of the resource; and
- Implications of fracking for astronomy research projects for SA.

Why destroy Karoo riches for fracking's short-term gains?

TIMELESS KAROO

Jonathan Deal
(Struik)



JONATHAN Deal, chairman of the Treasure the Karoo Action Group, which is fighting to prevent Shell from fracking in the Karoo, has written a wonderful book that clearly shows what will be lost if fracking is allowed to go ahead.

The book covers the five different parts of the Karoo – the central, northern and upper Karoo, the Great Karoo, the Hantam Karoo, the Tankwa Karoo and the Klein Karoo; there is not a remote corner or town that is not visited. Together with detailed maps and strip routes, it is possible to plan a visit or holiday to this quiet region where life is so much more leisurely.

Most South Africans experience the Karoo only while driving through it on the N1 – praying that their car isn't totalled by a half-asleep truck driver on the notorious "death stretch" between Touws River and Beaufort West. If they stop at all it is usually to fill up with fuel or to wolf down a takeaway in the middle of the freezing night.

But Deal encourages us to take a more leisurely journey and to discover for ourselves the hidden treasures of the Karoo's many towns. He delves into the history of all these places and meets the most interesting people, most of whom seem passionate about where they have chosen to live.

The many excellent photographs give you a good idea of the timeless spaces, the endless skies and the long history of settlement. We are told about such diverse happenings as

the transit of Venus in 1882 and the great flood of 1981. We meet Prince Albert's Helena Marincowitz and Hekkie Moos, Britstown's Adlene Potgieter, the famous Outa Lappies, Aberdeen's Danny van der Linde, Amalienstein's Hendrik Januarie and the itinerant nomads still travelling the back roads with

their donkey carts.

We also find out how the Moordenaarskaroos got its name and how Gustav Nefdt became the first man known to have climbed Ladismith's Towerkop. We visit some of the last remaining Anglo-Boer War blockhouses, the Blikkies Bar in Carnarvon, the Owl House in

Nieu Bethesda, and we hear the story of the execution of John Baxter from Gina de Beer in Aberdeen.

At the end of each chapter there is a section on the highlights of the towns featured, and it is ideal for planning your holiday, as is the section on accommodation and

tourism associations' contact details.

There are few better ways to truly get to know the Karoo than by meeting and staying with the people who have been there for generations. You get the sense of place, of the food, the down-to-earth humour, the long history and the expectations of the future. Deal has produced a

magnificent book that makes all these things clear and palpable, and it is with horror and disbelief that one now looks at the fracking saga.

You have to ask whether these people are crazy, or so hungry for riches that they would destroy all this for short-term gain.

JERRY BUIRSKI



Shell's promise: we will make

every drop count

The oil giant outlines commitment to

Karoo. **By Jan Willem Eggink**

FOR THE Karoo and its people, water is life, and accessing fresh water in this typically arid area can often prove a challenge. With this in mind, Shell made two commitments last year that are relevant to the Karoo shale gas debate.

First, we committed not to compete with residents of the Karoo for their fresh water, and second, we promised to set up an independent study of the groundwater resources using third-party experts to inform us and gather data useful for further development and protection of the region's water supplies.

Stage one of a "Groundwater Atlas" for the Karoo has now been completed – drawing on some of the country's top hydrogeologists. This is the first time a Groundwater Atlas of this type has been compiled for the region and these "Groundwater Gurus" are helping us understand the unique characteristics of Karoo groundwater, what is required to protect and preserve it, and where we could source the water for our operations.

The Atlas identifies the attributes of the groundwater resources, combining data from many different sources into a single database. It concludes that groundwater sys-

tems up to 300m below the surface are well understood, and highlights that groundwater is a renewable resource that should be considered for all water requirements. It is also clear that further work is required to understand the water systems in deeper geological horizons, where the water experts believe that exploration may confirm the presence of deep-level brackish water. This water would, in other words, be unfit for human or animal consumption, or agricultural use, but is likely to be usable in our shale gas operations. Experts also note that, historically, methane gas has been recorded to occur naturally in groundwater derived from existing shallow boreholes (those less than 150m deep) in the Karoo.

The work from this team of experts is available at the following website: www.shell.co.za

This is only the first step of several to increase our understanding of the Karoo water system.

Stage Two of the Groundwater Atlas will integrate field mapping and field measurements around our proposed areas of operation. This work will be complemented by a further independent surface-water study commissioned to assess possible surface water sources for our operations, including water from industrial waste and/or grey water.

But why do we do these studies in

the first place? The reason is that water is a scarce commodity in the Karoo, but is also key to our operations. Which isn't to say, as many people claim, that our Karoo project requires an excessive amount of water. It doesn't.

Various research projects, including two recent separate studies by the Massachusetts Institute of Technology and the Harvard Kennedy School, have shown that natural gas, including shale gas, has the lowest water consumption intensity of all power generation by fossil and nuclear fuels.

Returning to our first commitment, Shell has stated that we will not compete with the people of the Karoo for their water needs. What this means is that nobody in the Karoo will go short of fresh water as a result of our operations – not in the exploration phase or during any subsequent development.

What we know already is that the wells we plan to drill require the equivalent of two to three municipal swimming pools of water per well. In other words, the entire 24-well exploration project as defined by the Environmental Management Plan requires in the order of 60 pools of water in total, not the millions of

cubic meters that are often mentioned. I often find people make calculations without considering the pertinent variables – for instance, simply multiplying the number of wells by the volume of water to calculate total water usage. This ignores our recycling procedures, the fact that we are able to reduce our environmental footprint by capturing and reusing the water that comes back out of the ground after the hydraulic fracturing process. We have made great progress in this method in similar projects. In our North American operations, reusing water in closed-loop systems has halved our water requirements.

In addition to our water recycling



FURTHER WORK IS REQUIRED ON WATER SYSTEMS IN DEEPER GEOLOGICAL HORIZONS

procedures, we design our operations in such a way as to reduce the use of potable water, and to use non-potable – and particularly saline and brackish – water, wherever reasonably practicable. At Groundbirch, in Canada, we are investing in the construction of a reclaimed water plant for the city of Dawson Creek. The plant will treat sewage and other waste water so that it can be re-used in our operations, as well as by the local municipality, for activities such as cleaning roads and watering sports fields.

So where will the water for the Karoo project come from? For the initial exploration wells we intend to import the water by truck or rail, until the team of groundwater specialists can confirm alternative sources of deeper, brackish, non-potable waters.

Again, there seems to be much confusion on this issue, with people mistaking full-field developments in North America with what is, in this case, an exploration campaign.

The Karoo covers a vast and diverse area. Its characteristics change as one goes from east to west. This means the Cradock

area is very different from the Sutherland area, and our operations in each of these areas will differ as a result. Local communities can be assured that we will discuss the various operational options with them as part of our Environmental Social and Health Impact Assessment public consultation process.

Our operations will be acutely sensitive not just to the water situation, but to safety concerns and responsible practices in general.

SA faces a huge energy challenge, and will soon need access to a full range of energy sources. All sources of energy consume water, and most use more water than shale gas. We are devoting time and effort to understanding the water systems in the Karoo. My promise is that if we are granted the right to explore for shale gas in the Karoo, we will manage the water carefully, dispose of it responsibly, and make every drop count.

● *Jan Willem Eggink is Shell SA's general manager for upstream operations. Visit www.shell.co.za for more on Shell's commitments regarding water in the Karoo.*



Fracking blamed for poverty not profit

ENERGY Minister Dipuo Peters's recent raptures about shale gas benefiting Karoo communities is deeply troubling, given that actual data do not support her hopes.

Data released by the US government shows gas drilling in Pennsylvania has not resulted in

the expected economic boom.

The Standard-Speaker reports that shale-gas development has had "minimal impact on Susquehanna County income, even though the region is among the state's most-heavily drilled.

The average income decreased from 2008 to 2010, its unemployment rose by 3.2 percentage points and poverty increased from 2000 to 2010."

The job gains for Pennsylvania claimed by the industry have not materialised; instead, existing jobs and local economies have been devastated, with little economic benefit accruing to local inhabitants. The "resource curse", where

resource-rich communities end up with more poverty, seems to result from shale gas development.

Local communities are also worst affected by the air pollution and threat of water contamination of wells from shale gas development. The report concludes that health risks are greater for people living closest to wells.

The oil and gas industry's claims are not borne out by data.

It is immoral of industry lobbyists, and our government, to capitalise on the socio-economic conditions of Karoo inhabitants with false promises of jobs.

MARINA LOUW

Climate Justice Campaign

MAIL & GUARDIAN

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1

ID: 03974128-01 Source Page: 14

Farmers say 'no fracking way' to Shell

Stage set for showdown over 'misleading, biased, unprocedural and unconstitutional' application

Fiona Macleod

Shell's plans to drill wells for natural gas across a large swathe of the Karoo are fatally flawed and should be rejected, according to lawyers representing local landowners.

Derek Light Attorneys criticised Shell's environmental management plan submitted to the Petroleum Agency of South Africa (Pasa) this week, describing it as "a worthless paper exercise" that was misleading, biased, unprocedural and unconstitutional.

The attorneys also represent AgriSA and business tycoon Johann Rupert, who owns a farm in the Karoo. The area is the world's largest mohair producer and has wool, red meat and ecotourism sectors.

Shell Exploration, a subsidiary of Royal Dutch Shell, this week submitted plans to Pasa for wells to be drilled at various sites in the Karoo Basin using controversial hydraulic fracturing, colloquially known as "fracking".

"The general perception is put across in the draft environmental management plan that Shell maintains some lofty internationally accepted environmental standard that must surely be good enough for the South African context," said the lawyers' critique. "The strategy that Shell knowingly followed by submitting this fatally flawed plan is in fact an attempt to bypass legislation that is in place to protect the people of South Africa."

Shell's plan has set the stage for a possible legal battle over its ambitions

to drill for natural gas in shale formations that cover about 90% of South Africa. The country has the world's fifth-largest shale gas reserves and oil giant Shell, which reported profits of \$18.6-billion last year, is one of several companies preparing extraction applications.

Fritz Bekker, an environmental practitioner asked by the attorneys to review Shell's plan, said the impact of fracking could include chemical contamination, gas flaring, explosions and water reduction in an already water stressed environment.

Most of the proposed fracking activities were listed and needed environmental authorisation and impact assessments, but Shell's consultants, Golder Associates, had attempted to bypass these requirements.

"All risks to the environment and the people of the Karoo must first be investigated in detailed site specific specialist investigations before applications for unfamiliar and invasive exploration technologies should be considered," Bekker said.

Shell's plan suggested that eight wells would be drilled in each of the three areas it had mapped out for fracking, but no assurance was given that drilling would be confined to this. "It must therefore be assumed that Shell will drill as many wells as it may require..."

"We are of the view that the size of well sites has been understated and that the proposed one hectare exploration well sites provided for [in the plan] will be inadequate," the review said.

Bekker said the 50-odd scientists who worked on the review estimated that

each well site would have to include storage bunkers for explosives and hazardous chemicals, drilling tailings and rigs, gas burners, roads and accommodation facilities.

Shell's application did not include a plan to manage or rehabilitate these and other environmental impacts of fracking, in contravention of the relevant legislation, he said.

The review also criticised the public participation process involved in Shell's application. Given the unregulated and invasive nature of fracking, landowners should have been notified in writing and given the opportunity to make meaningful input, it said.

Instead, a limited number of landowners were invited to several public meetings hosted by Shell and were given less than a month to comment on "speculative" plans posted on Golder's website.

"As a consequence hundreds of landowners, perhaps thousands of interested persons, are still unaware of the process and the landowners have been prevented from participating meaningfully in the consultation process."

Bekker told the *Mail & Guardian* that a fatal flaw in Shell's application was the assertion by Golder that "no adverse impacts" fracking would cause.

"The National Environmental Management Act specifies that environmental consultants must not be biased.

"Golder Associates played along with Shell's strategy by conjuring a far-reaching blanket finding that no adverse impact will occur as a result

of Shell's activities on any environmental aspects, socio-economic conditions or cultural heritage resources in the Karoo.

"They have risked tarnishing their professional integrity by presenting this biased document as an environmental management plan and could be charged under the Act."

Detailed questions about the review, sent by the M&G to both Shell and Golder, were not answered. Pasa and the department of mineral resources have 120 days to decide on Shell's application.

Toxic asset

Global shale gas basins assessed for gas reserves



Graphic: JOHN McCANN. Source: EIA, ARI INC.

SA in the top five

Recoverable shale gas reserves in trillions of cubic feet



Graphic: JOHN McCANN
Source: EA ENERGY OUTLOOK 2011

Life's not a gas when you live near the wells

The mayor of Dish in Texas, Calvin Tillman, decided to leave town when his sons repeatedly woke up at night with mysterious nosebleeds.

Tillman told the *Huffington Post* recently he had spent his time in office fighting to regulate natural gas companies that have drilled 60 fracking wells into shale. But when his five-year-old son awoke with a severe nosebleed in the middle of a night filled with strong odours from the wells, he had no choice but to leave.

"He had blood all over his hands, blood on the walls, our house looked somewhat like a murder scene," he said.

Nosebleeds reported by many residents living near the thousands of wells dotted around the American landscape are just one

reason why fracking is under intense government scrutiny in the United States.

A moratorium on the gas-extraction technique has been imposed by at least 160 communities in the US, as well as in the United Kingdom, France, Germany and Canada's Quebec province.

In February, the *New York Times* published government documents that showed unacceptably high levels of radiation in drinking water near some wells. The documents revealed that waste water from some wells was being hauled to sewage plants not designed to treat it and then discharged into rivers that supply drinking water.

Gasland, a documentary by Josh Fox exposing the dangers of fracking, which has been shown at various locations in South Africa, was

a runner-up in the "best documentary" category at this year's Oscars.

And in a special report on "The great shale gas rush", *National Geographic* reported late last year that fracking wells had destroyed the Pennsylvanian idyll of a young couple, Chris and Stephanie Hallowich. After settling on 10 acres of long-fallow farmland, the couple found themselves surrounded by an industrial panorama that included four wells, a gas processing plant, a compressor station, buried pipelines, a three-acre plastic-lined holding pond, and a road with truck traffic.

"It's ruined our lives. That's what it comes down to," said Chris Hallowich. "It's ruined our plans that we had for the kids. It's ruined what we thought was our perfect 10 acres." — *Fiona Macleod*

What is fracking?

Hydraulic fracturing, or fracking, involves injecting huge amounts of water, mixed with sand and chemicals, at high pressure to break up rock formations and release natural gas.

A fracking well can produce millions of litres of waste water, which is often laced with highly corrosive salts, carcinogens such as benzene and radioactive elements including radium, all of which can occur naturally underground. Other carcinogenic (cancer causing) materials can be added to the waste water by the chemicals used in the fracking process.

Shell's environmental management plan said it would use "green" chemical additives in the Karoo. The critical review responded that this "is misleading as it is unknown what the

chemical composition of the fracturing fluids will be".

"Many of these chemicals are carcinogenic, hormone disruptors, mutagens (gene disruptors) or simply toxic to various organs or to the ecology. Others are secret or proprietary mixtures," said environmental researcher Glenn Ashton.

In the United States, the Environmental Protection Agency has documented diesel and radioactive material in fracking waste water. It said that it could not be made safe. According to a recent report in the *New York Times* radioactivity in the waste water in Pennsylvania, which has roughly 71 000 active gas wells, is sometimes hundreds or even thousands of times the maximum federal limit. — *Fiona Macleod*

Fracking opens deep divisions

Lisa Steyn

Fracking in the Karoo has opened up deep divisions despite the government's moratorium on all prospecting, pending an investigation into its impact.

Hydraulic fracturing, or fracking, involves drilling deep holes to capture methane gas within the shale. Oil company Shell wants to go into the Karoo but some experts are horrified by the idea. Others see it as an exciting opportunity.

At a debate hosted by the Johannesburg Press Club and EE Publishers this week, Dr Anthony Turton, a professor at the Centre for Environmental Management at the University of the Free State, felt the issue went down to the public's lack of trust in large corporations and the government. "If Shell hadn't engaged the way they did, this wouldn't have happened. It's in a part of the country that is highly water constrained. It may have a small population but it is a popu-

lation of people not dependent on the government," he said.

Karoo farmers are campaigning against fracking, concerned that the drilling could contaminate the area's drinking water.

Professor Phillip Lloyd of the Energy Institute at the Cape Peninsula University of Technology said more than a million holes had been drilled globally in the past 60 years. That experience had shown that, although spillage was a major issue, it was possible to minimise and mitigate against it. There was minimal evidence, he said, that fracking contaminated drinking water supplies.

But Dr Chris Hartnady, a geologist and the director of Umvoto Africa, disagreed saying that in his experience the highest risk was the contamination of ground water because of cement failure in well casings. "It is the Achilles heel of the system," he said.

Journalist Ivo Vegter said the anti-fracking campaigns were dishonest. "There is no cred-

ible evidence to show that shale drilling is risky."

He said the only real contamination was that of methane being released from the shale, but it was not a regulated substance in drinking water. "If they say it will poison the water, I'm afraid what they are selling is absolute swindle," Vegter said.

More alarming, Hartnady noted, was the risk of earthquakes should there be tectonic stress around the boreholes. "I call the Karoo the Cape stress province. Poking and stressing holes in the Karoo is like poking a lion with a stick — you do it at your own peril."

But Vegter disagreed. He said there was no significant seismic risk in hydraulic fracking and it would not cause cracks that could reach the aquifers, as some detractors had claimed.

Lloyd said if Shell invested exploration cash in South Africa it would create thousands of jobs.

It could reduce the greenhouse

gas footprint in South Africa and the impact on the Karoo would be minimal, he said.

The natural gas resource was massive and could mean that one day there would be combined gas turbines all along the coast. "It could break Eskom's monopoly," he said.

Turton said the data that decisions were based on needed to be open, transparent and credible. He also felt not enough effort was put into understanding renewables. "I support the precautionary principles. We need our decisions to be based on the best possible science," he said.

But Lloyd described the precautionary principle as an "intellectual cop-out" because it was impossible to prove a negative. "It just doesn't add up in spite of its seductiveness," he said.

Turton said the solution had to be negotiated. "What will emerge is a new social contract. It will change the way large corporations deal with things in South Africa."

The big interview

Fracked if you do, fracked if you don't

The Karoo saga is much ado about a golden opportunity for Shell, says its upstream manager

Lynley Donnelly

There appears to be no middle ground in the subject of fracking. Depending on who you speak to, hydraulic fracturing — the process of jetting a mix of chemicals, water and sand into shale formations deep underground to release natural gas — is either the enemy at the gate or a saviour around the corner.

Critics believe it will lead to barren landscapes and poisoned water wells. Proponents believe it is the path to energy security, job creation and billions of rands in investment.

For developers of shale gas fields, such as Shell, it is a rapidly expanding portion of their global operations. Jan Willem Eggink, upstream manager of Shell South Africa, finds it a difficult environment in which to have sober, unemotional conversations on the subject.

But these, he said, were what were needed for South Africa to decide whether or not fracked gas should join the country's future energy mix.

The former country chairman of Shell in Libya, Eggink spoke to the *Mail & Guardian* from The Hague in his native Netherlands.

He relocated to South Africa in May, just after the local fracking debate intensified following the department of mineral resources's decision to place a moratorium on fracking in the Karoo. The moratorium extends to February and includes applications for explora-

Number crunching

400 000

Shell projects that its North American unconventional or tight-gas production could reach more than 400 000 barrels of oil equivalent per day by 2015.

250 000

Tight gas produced by Shell during 2010 was about 7% of its upstream production or 250 000 barrels of oil equivalent per day.

248 000

Last year Shell produced about 200 000 barrels of oil equivalent per day in North America and 48 000 barrels of oil equivalent per day in China.

7-billion

With acquisitions, the Shell portfolio in 2010 included about 40-trillion cubic feet of natural gas, the energy equivalent of nearly seven-billion barrels of oil. — *Shell*

tion from companies such as Sasol. Despite the highly publicised opposition to the idea, Eggink regards fracking in the Karoo as a golden opportunity for Shell.

"We have a massive opportunity for South Africa to become self-sufficient in energy, with a very limited surface impact," Eggink said.

Should exploration be permitted on the 90 000km² of land to which Shell has applied for rights, 24 exploration wells would be drilled, each the size of a football field. It will help to determine how much gas is available and whether its extraction will be commercially viable.

The "size of the prize" is uncertain, but has been tipped by the International Energy Agency at 485 trillion cubic feet of gas, although Eggink remains sceptical of this figure until exploration is complete.

Nevertheless, he said, this was compared to Mossel Bay's gas fields of a mere one trillion cubic feet and could be a "game changer" for South Africa. If the gas could be developed, the actual footprint of development would be about 1% of the total area for which Shell has applied.

The exploration process, with a minimum commitment to drill six exploration wells, would mean a R1.5-billion investment by Shell "which is entirely our risk capital", said Eggink.

In the United States, where fracking has been hotly debated, Shell has ramped up its operations in unconventional or tight-gas drilling, which includes shale gas developments.

Eggink argued that the US, where drilling began a decade ago, was now considering exporting gas and industries who had moved their operations to Asia were considering repatriating to take advantage

of lower energy prices and the increased availability of energy. In places such as Texas, it is estimated that in excess of 100 000 jobs have been created through Shell's gas drilling operation.

But in the US fracking has divided public opinion. Shale gas developers have been accused of damaging water supplies and causing other environmental damage. They are also accused of frustrating independent research through the extensive use of non-disclosure agreements when settling law suits with aggrieved parties.

The industry has been accused of overstating its job-creation record in the Marcellus shale gas fields in New York, following the release of research by Pennsylvania's Keystone Research Centre in June.

In recent months the *New York Times* has reported on speculation of a possible bubble in the shale gas market after it was alleged that companies had overstated the productivity of their wells and the extent of their reserves.

In the United Kingdom fracking activity has been linked to an earthquake in Lancashire, near Blackpool. And US media reports have speculated that a massive earthquake in Oklahoma last weekend may also be linked to fracking activity.

Jobs

Eggink admits that expectations of job creation in the exploration phase will need to be managed because Shell will have to import highly skilled technical expertise. But should development begin in earnest, he said, businesses were likely to be launched to provide services to the drilling projects. There was also the multiplying effect of jobs in downstream industries that could start up with the additional energy that would be made available.

Eggink said Shell estimated that 30 to 50 local jobs could be created in the exploration phase by the company and its contractors. But the development of the wells would only be complete after about nine years, making it difficult to give precise figures, he said.

"What we know from analogues like the United States is that the pure fact that energy is abundantly available makes a huge difference in the way industries build up."

Shell was prepared to partner with universities to help create a cadre of people with the skills the company

may need in a decade, said Eggink. Gas production would only come on line in a decade, but shale gas wells could last from 10 to 20 years.

Water and earthquakes

The fracking process is water intensive and the Karoo is an extremely water-stressed area. Just to drill an exploration well, without any fracking, requires one to two million litres of water. To drill a development well requires five to 10 million litres.

In its environmental management plan Shell had committed itself to not compete with farmers and Karoo residents for water, said Eggink.

Shell recycles 60% to 80% of the water in its operations. For the exploration phase Shell would import water into the Karoo, said Eggink. But the exploration wells would also help Shell determine how much brackish underground water was available that would not otherwise be used for consumption.

Shell has already commissioned local experts to better understand the water availability in the area. But this has not allayed residents' fears that groundwater could be contaminated, given the variety of chemicals that are used in the fracking process.

Although there is a variety of chemicals available, Shell typically uses four to five in any drilling operation. Eggink said Shell would publicise the chemicals it used, should fracking go ahead.

He stands by the industry line that, of the million or so wells drilled, not a single documented case of groundwater contamination exists.

Water from fracking operations that was not recycled would be stored in containers on site, he said, rather than in the much-maligned lined pits that have been common practice in the US. This could then be taken to any water treatment plant to be cleaned.

Local experts have warned that fracking in the Karoo may increase the chance of seismic activity. Although South Africa has a long history of mining-induced seismicity, the danger with fracking is that tremors damage the concrete casings surrounding well shafts, potentially causing gas leaks or the seepage of fracking fluid. Eggink said Shell had experience of operating in seismically active areas and its "operational standards are such that its wells can withstand a lot of force".

Bubble?

Eggink said he was not surprised that the numbers quoted by companies for gas resources had declined, because this typically happened once exploration revealed the extent of economic reserves — or those that could be commercially exploited.

"The volumes that you can extract commercially get smaller over time. It's not the case that it becomes less attractive, it's only that we learn more and we get a better estimate of what can be economically and commercially produced."

With declining gas prices marginal projects might struggle, he said, much like oil projects that faced problems when the oil price dropped.

I'm no fracking celebrity

Kevin Davie's column in last week's *Mail & Guardian*, "Celebrity showbiz tactics leave us in the fracking dark", portrays me as a celebrity removed from the issue of fracking in the Karoo in any relevant way.

Fracking is a water issue. The technology uses vast quantities of water and pollutes underground aquifers.

As a maritime lawyer and endurance swimmer — someone who is literally immersed in water — I will not stand idly by and watch Shell and other energy companies destroy our most precious resource. The right to clean water is our most fundamental human right and is guaranteed in our Constitution. We live in an arid country and we must protect our water. We cannot survive without it.

Secondly, I owe it to my relatives, who have been living peacefully in the Karoo for nearly 200 years, to stand with them in their rejection of fracking in the area.

As the late Nobel prize-winning Wangari Maathai pointed out: "In a few decades, the relationship between the environment, resources and conflict may seem almost as obvious as the connection we see today between human rights, democracy and peace."

Finally, Davie suggests that what is needed is more transparency on policy. That is precisely the reason why the action group recently took the mineral resources minister to court over her appointment of a secret task team to investigate the merits of fracking.

Issues of such importance and public interest cannot be left to energy companies and a closed circle of government officials to decide. It sets a bad and potentially poisonous precedent for our democracy. — *Lewis Gordon Pugh, vice-chairperson of the Treasure the Karoo Action Group*

Greening the Future Awards

A watchdog with strong bite

Not-for-profit organisations award
Winner: Treasure Karoo Action Group

Michelle Nel

Whatever the government decides about fracking in the Karoo, a small group of volunteers has succeeded in broadening the debate about the controversy and showing what could happen if it was allowed to go ahead.

Fracking, or hydraulic fracturing, involves the injection of a mixture of chemicals and water into deep shale rock formations to extract gas. Shell and other energy companies have applied for exploration rights across more than 230 000 km² of the Karoo.

Jonathan Deal, chairperson of the non-profit organisation Treasure the Karoo Action Group, says fracking threatens to pollute scarce groundwater reserves in the semi-desert area and the government should apply the precautionary principle before granting any mining rights.

Pressure from his and other environmental lobby groups forced the government's hand in placing a moratorium on fracking last year

and setting up a task team to investigate shale gas extraction. The final report is due in July.

"We oppose fracking until it is proven that this is the best answer to South Africa's energy and employment needs," Deal said.

"We are urging the government to refocus on renewable energy sources, which are often forgotten in the rush to mine shale gas."

The group was launched in January last year and is staffed mainly by volunteers. Through research, media releases, brochures and comics it has publicised the controversies surrounding fracking.

"I do lots of presentations at schools and warn the children that they will pay for their parents' bad decisions, so they must get involved now," said Deal.

He cannot fathom why the government is chasing fossil fuel: "Saudi Arabia is oil-rich, yet it is moving to renewables. South Africa's solar irradiation levels are 2.5 times higher than Saudi Arabia's. Along with Brazil, South Africa has the best usable sunshine in the world, especially in the Northern and Western Cape."

Deal, now semi-retired, owns a farm in the Karoo, although it is not near the areas that could be affected by fracking. His love for this arid landscape can be seen in his photographs in a coffee-table book titled *Timeless Karoo*.

The Treasure Karoo Action Group has developed on the back of volunteer efforts. Initially self-funded by a core group, it is now increasingly supported by public donations.

"The environmental fight is long, lonely and costly," Deal said. "But had we not begun this campaign, international giants would already be exploiting this resource in spite of not fully understanding the technology or its impacts."

The Greening judges said, even if the group did not succeed in stopping fracking, it had helped to make sure it would happen in a more responsible way.

"This kind of campaigning civil-society watchdog is exactly what South Africa needs right now. With the national planning commission leaning towards fracking, we could be heading for an interesting show-down," they said.

Fracking issues require new laws

Existing legislation does not address its legal, environmental and social ramifications

ENVIRONMENT

David Fig

Hydraulic fracturing, or fracking, involves high-pressure drilling into deep underground rock formations to mine for shale or methane gas. The drilling is vertical until it reaches the relevant rocks, when it will become horizontal. A mixture of water, toxic chemicals and sand is pumped into the rock and the gas released by enlarging small fissures is pumped back to the surface.

Huge quantities of water are used in the drilling: an estimated 1500 truckloads or about 25-million litres for each drilling. The water will have to be trucked in, because it is not available in the areas designated for fracking, mainly in the Karoo basin. Up to 30% of the water will remain underground and be subtracted from the hydrological cycle.

The chemicals are potentially hazardous and will have to be managed scrupulously. Up to 8% of the shale gas will escape in the process and enter the atmosphere, creating a problem for climate change. Methane is a greenhouse gas 28 times more lethal than carbon dioxide.

The moratorium on fracking is still in place. A likely scenario is that the interdepartmental task team report commissioned by the minister of mineral resources will be passed on to the Cabinet, which may decide to lift the moratorium. Then the regulator, the Petroleum Agency of South Africa, will grant existing applicants – Royal Dutch Shell, Challenger and Falcon – permission to explore.

The applicants will begin to frack immediately to establish whether the shale gas production is viable. Under existing mining laws, exploration

can occur for up to nine years and an exploration right is usually converted easily to a production right.

Because of environmental and social factors, there are a number of administrative flaws in this process that the minister should correct before this scenario plays out.

First, shale gas recovery falls under the existing mining laws, namely the Minerals and Petroleum Resources Development Act of 2002, which is a bad idea. People who make their livelihoods in the Karoo rely entirely on underground water for their survival. The risk of contamination is high – “the fracking liquid will contaminate the groundwater; there is no doubt at all”, according to the University of the Free State’s Gerrit van Tonder, a professor of groundwater studies (Daily Maverick, June 15).

Mismanagement of the toxic chemicals would have major impacts on environment, health and agriculture.

Trucking in fresh water, sand and chemicals to each well will cause immense dust pollution from the gravel roads of the Karoo. Because fracking has such obvious effects on the environment and was not foreseen in 2000 when the Act was written, it is imperative to write a new Act to cover the specifics of the shale gas industry to ensure it does minimal harm to the fragile Karoo environment. The minister of water affairs should also look at strengthening the protection of underground freshwater resources, which is not adequately covered in the Water Act.

Under the minerals and petroleum Act, the regulator is also a national agency to promote the oil and gas industry. This is a clear conflict of interest. These functions should be separated immediately. There is an urgent need for a separate, independent regulator for shale gas extraction.

The law is also weak on environmental protection. Currently, the applicant has to do an environment management programme report within 120 days of applying to

explore. But it is impossible to come up with a robust scientific analysis of risks – and plans for the mitigation of risk – in that time. Presentations to the public on the Shell application have happened, but not in the case of the other applicants.

In any case, the environment management programme report process is outmoded. It is regarded as a watered-down version of an environmental impact assessment, a more robust process. The departments of mineral resources and environment previously agreed that in future mining would be subjected to environmental impact assessments instead of in-house environment management programme reports. The environment department has taken the steps necessary to make this possible, but the mineral resources department has dragged its feet, and sabotaged the change.

The less stringent environment management programme report process will apply to fracking. But because fracking is such a risk to the environment, it is imperative that more robust assessment processes must prevail.

In practice, there needs to be a strategic assessment after the exploration phase so that future problems can be recognised and steps to mitigate them put in place. There should be no automatic conversion to a production right without a significant independent assessment of the impacts of exploration.

And what of the costs that the fracking industry will pass on to the taxpayer and to local industries?

Farmers in the Karoo have said they believe fracking and agriculture are incompatible. Water contamination and dust pollution could cost the Karoo its reputation for purity, ruining the reputation of products such as Karoo lamb. The minister should ensure that, to minimise dust pollution, the fracking applicants pay to tar the roads they will use to deliver water, sand and chemicals to the wells. This cost should not be passed on to taxpayers, nor should

it jeopardise existing livelihoods in the region. If farms fail in the Karoo, 70 000 workers will be affected.

Hazardous waste management under South African law is a provincial function. Fracking will occur mostly in the Eastern and Northern Cape, among the poorest provinces in the country. They have few facilities for the management of hazardous waste, which will require immense resources to contain that from shale gas exploitation. Facilities will have to be put in place and people trained to manage them.

These costs should be borne by the industry and not passed on to the taxpayer. The polluter-pays principle, enshrined in our environmental legislation, should apply and needs to be negotiated before the moratorium is lifted.

Before beginning production, the industry should also be made to sponsor epidemiological baseline studies in the concession areas to establish the health status of the local population before any fracking takes place. This would allow continuous assessment and monitor-

ing to establish the industry's role if the health of local inhabitants is affected. The industry should also be prepared to compensate proven victims.

When the department of energy researched the country's optimal energy mix, no account was taken of the potential of shale gas. The integrated resource plan 2010 did not include any mention of unconventional gases.

But the plan is meant to be updated every two years. There is currently no attempt to produce an integrated resource plan 2012 and it is unclear how the state plans to integrate shale gas into energy planning. The process is meant to be transparent and participatory, but there has not yet been any consultation with the public and affected parties.

There has been no formal public debate on the shale gas industry. Instead, the industry will come to life the minute the moratorium is lifted and the regulator approves the applications for exploration. This flies in the face of our constitutional prerogative for transparency as well as for public participation in decision-making.

The impacts of this industry will be long-standing. Fracking will compromise our supply of fresh water. It may contaminate the Karoo's fragile resources and do away with livelihoods. It will add to problems of

global warming and climate change. It will extend South Africa's dependence on fossil energy rather than encouraging the use of renewables. Therefore, the industry needs much more public debate.

The government should not hand over control of our resources without applying the highest standards of monitoring and the most robust initiatives for environmental, health and livelihood protection. The moratorium should not be lifted until there is substantial agreement on these proposals.

David Fig is honorary research associate at the environmental evaluation unit, University of Cape Town

The people must have a say

The Southern Cape Land Committee is a non-governmental organisation established in 1987 to support communities fighting against forced removals. We continue in the democratic era to promote equitable land redistribution and support farm dwellers and emerging farmers in the Eastern Cape and central Karoo.

Fracking in the Karoo is an important issue. The perception that fracking is confined to a struggle by white farmers seeking to retain the status quo and obstruct job opportunities is simply not true. Fracking will affect

us all, especially in a water-scarce country such as ours.

We call on the government to ensure the meaningful participation of all our people, facilitated by nonpartisan institutions. We call for the extension of the moratorium on fracking to enable citizens to make an input.

How is fracking going to help our country to address skewed land ownership, or will it further compound the problem? What jobs will fracking create, for whom and how many? We believe that fracking will not address the gap between rich and poor.

What are the risks to our precious natural resources and how will this affect future generations?

We call on all South Africans to urge the government not to fall for the empty promises of multinational companies. We call on progressive civil society organisations to work to protect our natural resources.

We demand that the participation process explores alternatives to shale gas. Our future is not for sale. — *Phumi Booysen, on behalf of the Southern Cape Land Committee*

Resources

Fracking spin-offs trump concerns

The summary of a government report makes it clear what is favoured



AGENT PROVOCATEUR
Lynley Donnelly

Nine pages — that is all South Africa got after months of silence over hydraulic fracturing for shale gas in the Karoo.

It was the executive summary and a list of seven recommendations from a much-anticipated report that proposes “conditional approval” for a process widely known as fracking.

But the department of mineral resources has given assurances that it is simply a precursor. The full report, which apparently runs to 3 000 pages, including annexures, will be made available within a week. The tome needs some “professional editing” to cross the Ts and dot the Is, according to the department.

But after months of “no comment” from the government on the subject, it is little wonder that Mineral Resources Minister Susan Shabangu, clutching the stunted nine pages in her hand, was greeted with scepticism. Journalists, civil society members and even the odd corporate representative with arched eyebrow were present at the press conference on Tuesday.

Their questions focused on issues such as why public consultation was taking place only after the moratorium on exploration was being lifted. There were repeated requests for clarity on whether fracking would take place during the exploration phase and what effect that could have on South Africa’s scientific jewel — the square kilometre array radio telescope.

The mood of the conference prompted the deputy minister, Godfrey Oliphant, to step in and remark that he had expected more excitement from those in attendance. “But we look very down,” he said.

According to Oliphant, South Africa has massive “inferred” gas resources and is a world leader in gas-to-liquid fuels technology. “We are changing the landscape of this country when it comes to energy generation,” Oliphant said, using a rather unfortunate turn of phrase.

The pages hint at what a game-changer shale gas could be — a potential R1-trillion boon to the economy. But they also warn that no assumptions can be made without further study and the economic gains will not be immediate, because a mature shale gas industry will take 20 to 30 years to develop.

But the biggest challenge is to beef up the country’s laws to manage the development of the potential industry and do it in a way that ensures the environment and wellbeing of the people are protected.

“The primary conclusion reached in this report is that South Africa’s regulatory framework must be robust enough to ensure that, if hydraulic fracturing associated with

shale gas exploration and exploitation were approved, any resultant negative impacts would be mitigated,” the report states.

Compliance monitoring and the implementation of often progressive laws are the government’s Achilles heel. The devil will be in the legislative detail.

But this is unlikely to stem enthusiasm for shale gas. By May this year, Bundu Gas & Oil, Falcon Oil & Gas, Shell Exploration, Sungu Sungu Gas and Sasol Petroleum International with Statoil and Chesapeake Energy Corp were listed as having applied for exploration rights in the Karoo basin, according to the Petroleum Agency of South Africa. A company called Msix has also applied for exploration rights for natural gas in an area with coalbed methane potential. The applications were frozen under the moratorium and Sasol subsequently stated that it has relinquished its technical co-operation permit with Statoil and Chesapeake.

The report refers to the often-cited United States Energy Information Administration’s estimate of a technically recoverable 485-trillion cubic feet. The more “moderately optimistic estimate” of 30-trillion cubic feet, which the local industry is understood to believe, could see a gross sales value of nearly R1-trillion, assuming a price of \$4 per 1000 cubic feet of gas and an exchange rate of R8 to the dollar, it states.

Shale gas “clearly has the potential to have a major impact on the national economy”. Its potential for energy security, in both liquid fuels and electricity, depends on the confirmation of significant proven reserves, which could not be ascertained without research, the report states. An extended ban “would delay

or prevent an improvement of the understanding of the real extent of the potential resource, hamper the development of coalbed methane and other hydrocarbon resources in low-permeability reservoirs and remove the potential economic benefit to severely deprived communities in the Karoo".

The document does not claim to be comprehensive, because "new reports and technical developments continue to emerge" and "further work is required in several critical areas".

One of these is environmental impact, particularly concerning water management and the extensive hydrological and geohydrological mapping that needs to be done before exploration or production drilling for shale gas can begin.

"The effects of dolerite intrusions, kimberlite fissures and existing fracture systems are relatively unknown and further investigations and modelling" is required.

Although the country's environmental laws are sufficient to monitor the impact of shale gas exploitation on land use, water use and air pollution, an immediate concern is water use and disposal – notably the "volume and transportation of the water, the potential contamination of water resources and the disposal of used

fracturing fluid".

According to the report, the current regulatory framework, which involves several Acts, needs to be reviewed and overhauled. A "detailed assessment and augmentation ... of the framework applicable to the upstream petroleum industry as a whole to ensure robust regulation and compliance monitoring" is needed.

But questions of compliance, which will be mainly under the purview of the minister for mineral resources, are of particular concern.

Oliphant said the department was "doing its best" and the "principle of the polluter pays" is part of local law. "There are licensing conditions as to how people must behave when they mine in the country, and we take them as responsible corporate citizens that must take care of the environment as well," he said.

One of the report's recommendations is the establishment of a monitoring committee to oversee the "comprehensive and co-ordinated argumentation of the regulatory framework and supervision of operations", which is expected to take six months to a year.

The Mineral and Petroleum Resources Development Act, which is meant to be a pillar in the framework to govern fracking, has been up for amendment for more than a year. Vagaries in the law contributed in part to a fight over mineral rights between Kumba Iron Ore ArcelorMittal and Imperial Crown Trading.

The report recommends that normal exploration, excluding actual fracking, is permitted to go ahead under the existing laws.

Only once the monitoring committee is established, the regulatory "augmentation" process is complete and the departments of science and technology and mineral resources develop mechanisms for the satisfactory coexistence of radio-astronomy projects and fracking in the Karoo can hydraulic fracturing start. It can only take place under the strict supervision of the committee and, "in the event of any unacceptable outcomes, the process may be halted".

It also recommends that research into the development of shale gas and its impact should continue.

For more on fracking, see Page 24 of the *Mail & Guardian*

SUNDAY TIMES

Mashego 2011a: 4

1

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First blood to pro-frackers

But anti lobby warns it could trigger Karoo earthquakes

TSHEPO MASHEGO

SOUTH Africa's often schizophrenic attitude towards foreign direct investment (FDI), especially in the extractive industries, was once again on display at the so-called "Great Fracking Debate" in Johannesburg this week.

While the country aspires to be the gateway and conduit for FDI into the African hinterland, it still puts obstacles in the way of prospective investors.

A bemused mining lawyer representing one of the largest foreign mining companies wondered why so much emotion had been whipped up over the issue of searching for gas in the Karoo using the fracking method, and why the state had created difficulties for routine mining operations, especially in the Mpumalanga coalfields.

Water licences can take several years to be approved, while environmental impact assessments are so prohibitively expensive that they can delay projects for years.

Dr Phillip Lloyd of the energy unit at the Cape Peninsula University of Technology said it would be a shame if such obstacles, combined with the shrill opposition of environmental activists, discouraged Shell and other companies from prospecting for gas in the Karoo.

He said: "If Shell's prospecting is successful, the impact on the Karoo will be minimal. However, it will change the face of this nation forever.

"First of all it will create thousands of jobs. The Americans have inferred that the Karoo contains a resource of 1 000 Tcf (trillion cubic feet, the unit used to measure gas volumes), which is

huge. Moss gas was launched on the understanding that there might be 1Tcf.

"If it is as big as that, it could put combined cycle gas turbines all along the coast.

"It could break Eskom's monopoly. It could put new steelworks on the Sishen-Saldanha axis. It could feed several new

gas-to-liquids plants and make the country completely independent of imported crude oil.

"And, as a little aside, it could run all our taxis on liquefied natural gas."

Perhaps the most important implication of the discovery of substantial gas resources in the Karoo will be the potential for

reducing South Africa's carbon footprint quite cheaply.

Lloyd added: "At the moment we know that coal gives off about 2.7 times more carbon dioxide than gas for the same amount of energy. So we need gas desperately if we're going to get our carbon footprint down."

However, the professor's as-

sertion that fracking for gas and generating electricity from it is a viable means of reducing the country's carbon footprint and general pollution was vigorously challenged by another speaker.

Chris Hartnady, technical director of earth sciences consultancy Umvoto Africa, said fracking was not only an environ-

mental threat but a small amount of induced pressure from fracking had the potential to trigger earthquakes.

"A relatively small amount of induced pressure from reservoir loads, mining activity, or from hydraulic fracturing, will trigger earthquakes that may just be waiting to happen.

"Hydro-fracking in the Karoo may be a little bit like poking a sleeping lion with a stick; one does so at one's peril."

The argument for progress, development and jobs won the day — the vast majority of the audience (82 to 31) favoured continuing gas prospecting in the Karoo.



energy in SA.

He said the TKAG had no legal way to compel the government to keep the moratorium in place. The group's first legal action will come if and when exploration licences are issued.

Deal said the TKAG was ready to take the fight up to the Constitutional Court to prevent fracking.

Aside from the environmental concerns about shale gas exploration, there have also been fears that it might

adversely affect the Square Kilometre Array (SKA) telescope, as fracking could trigger earth tremors.

The Astronomy Geographic Advantage Act of 2007, which was meant to boost SA's bid for the SKA, gives the government a mandate to prohibit anything that harms astronomy in the SKA region.

Chabane said he understood from the task team's report that there would be a buffer zone between the shale gas exploration area

and the location of the SKA.

He said that, according to scientists, the buffer zone would be sufficient to ensure neither of the programmes would be affected negatively.

Norman Ndaba, director for energy at Ernst & Young, said the cabinet's decision was good news as the time and money spent simply to prove the reserves will benefit the economy.

The SA Chamber of Commerce and Industry said the potential environmental con-

sequences of fracking must be balanced against the economic benefits.

"Sacci supports the fact that companies that wish to undertake shale gas exploration will have to comply with the stringent SA environmental impact assessment standards," said chamber CEO Neren Rau.

Comment on this:
letters@businessstimes.co.za

www.timeslive.co.za

JAN-WILLEM EGGINK

SHOULD the shale under the Karoo hold economically recoverable natural gas reserves, then this resource may contribute significantly to meeting South Africa's energy needs. Indeed, if these gas volumes prove to be as large as is estimated, the country may even be self-sufficient in energy for decades to come. But we can discover this only if we do some exploration.

The latest technology used to extract shale gas is new to South Africa, and some people have concerns about the environmental effect. Shell takes these concerns seriously — but we believe they can be allayed to arrive at an understanding that balances the local impacts of our exploration and production operations with the benefits to South Africa. We believe the environmentally sensitive Karoo can be protected, even if it becomes a national energy resource.

Let me outline what Shell's exploration plans and a possible field development would entail.

What will Shell's exploration programme involve?

The only way of finding out whether there is shale gas in commercial quantity in the Karoo is by drilling exploration wells. We would first prepare and submit an environmental

impact assessment. Our plan would be to drill at least six wells within the first three-year licence period. If these first wells show encouraging results, we will probably want to drill possibly as many as 24 more exploration wells. These will provide information on any other rock layers that will be drilled, and any water layers that may exist.

How will the wells be drilled?

Wells are drilled in sections, each of which is lined with metal casing. The casing is cemented in the borehole to isolate the well from the surrounding rock. We

Karoo fracking: Shell details its plans

Finding water in the desert is a problem

pressurise each completed well section to test for leaks before drilling the next section.

If the exploration wells confirm the presence of natural gas, we would probably drill the last section of the wells horizontally, keeping it in the shale layer. We would then fracture the shale layer hydraulically, to try to release the gas.

What is hydraulic fracturing?

Hydraulic fracturing — or "fracking" — involves pumping fluid out of a sealed-off section of a well to crack the surrounding rock with hair-size fractures. The fluid typically consists of

99% water with a small amount of sand, and less than 1% chemical additives.

Early on, Shell committed itself to disclosing the additives that would be used in the Karoo. The oil and gas industry has been fracking vertical holes for more than 60 years, and horizontal hole sections for more than 20. It is a routine operation to make rocks give up more oil or gas.

As long as the well is properly drilled and completed, and then pressure-tested diligently, there should be no cause for concern. Hydraulic fracturing is absolutely key to understanding whether the Karoo can produce sufficient gas for a gas development.

What will a field development involve?

If we decide to go ahead, we would typically have some 50 drilling-rig sites, or well-pads. From each of these sites, which is about the size of a football pitch, as many as 32 wells might be drilled horizontally in different directions.

These sites are typically 4km to 5km apart. A development would be limited to a surface area less than 1% of the area Shell has applied for.

At Shell, it is standard practice to consult landowners and local communities before we begin drilling, to determine how best to mitigate the impact of our operations, and how best to optimise any infrastructure improvements to the community. Drilling as many wells as possible from one site is an example on how we reduce our surface footprint.

Once the wells are drilled and fractured, relatively little

on-site activity is necessary to keep the wells producing for 15 years or more.

What does this mean for jobs?

In the early exploration phase staff with highly technical skills will have to be brought in from abroad. As we progress, we see a local service industry developing, creating hundreds — and possibly thousands — of jobs.

Will operations affect the local water supplies?

Water is indeed a challenge for this project. There are two main concerns: whether the drinking water of the Karoo could become contaminated by drilling or fracturing fluids or the shale gas, and whether there is enough water for everyone's use.

If a well is properly constructed, fluid won't leak into the ground water. This is one of the key conclusions and recommendation in a US Energy Department report into the potential health and environmental implications of hydraulic fracturing. Any waste water we generate would be kept in containers and appropriately disposed of. The natural gas we produce typically lies thousands of metres below freshwater aquifers. So it is virtually impossible for liquid — or

indeed gas — to reach drinking water through localised cracks induced by fracking.

We have promised not to compete for water with Karoo farmers or residents. So during exploration we intend to bring the water we need from elsewhere. If we decide to develop the sites, we will have a better idea where we can get water from.

● *Eggink is the upstream general manager for Shell in SA.*

Activists turn to court to see fracking reports

LUCKY BIYASE

THE gloves are off in the battle between environmental activists and the department of mineral resources on Karoo fracking licences.

The Treasure the Karoo Action Group has petitioned the department to make public a progress report on the decision, endorsed by the cabinet, to invoke a moratorium on licences in the Karoo, as well as records on the department's commitment to lead a team to fully research the implications of the proposed hydraulic fracturing in the area.

According to papers filed with the North Gauteng High Court, the group is using the Promotion of Access to Information Act to demand that the department provide records on its commitment to commission research and the identities and qualifications of members of the working group and task team.

The group also wants to see reports on the meetings of the two groups and their research documents.

The department has filed papers to oppose the action.

The report by the department was supposed to have been made public in July.

Then the release of the report was postponed to September, but it has still not been made public.

The department did not respond to enquiries about the delays.

Jonathan Deal, coordinator of the group, has confirmed the receipt of notice of intention to oppose the action from mineral resources minister Susan Shabangu.

"They have a period of time to provide us with an answering affidavit after which our legal team will take a decision as to how to proceed and when," said Deal.

"We have not approached this litigation on whim and urgently require access to this critical information on an issue of national importance to all South Africans," he said.

"We do not have an extreme view that says no fracking, never ever.

"We rightfully expect the government to include all stakeholders in an open debate and to scientifically examine fracking over a period of years, not a few months," he said.

Deal said prospective oil and gas companies offer the prospect of jobs, energy and revenue for SA for obvious reasons.

"They know that our government

and all other governments are desperate to offer their voters any hope of a job.

"Our government has not properly researched the fact that revenue and jobs have been deliberately overstated," he said.

Justin Truter, director of environment at Werksmans Attorneys, said the scramble for shale gas in the Karoo and the way the minerals authorities are dealing with it raises fundamental constitutional issues.

"These are most pertinently the right to have the environment protected for present and future generations, the right to have access to information held by the state and the right to administrative action that is lawful, reasonable and procedurally fair," he said.

Werksmans is acting for one of the affected land owners and has opposed applications by two companies for rights to explore for shale gas.

'We do not have an extreme view that says no fracking, never ever'

Before the first exploration, a number of important legal principles are likely to be tested in courts.

Considering the constitutional nature of many of the principles at stake, the matter is likely to find its way to the Constitutional Court, Truter said.

He said that, in the context of the National Environmental Management Act principles and in the light of the present gaps in knowledge, a strong argument can be made for a risk-averse and cautious approach to be followed.

"With this in mind, the minister's declaration of a moratorium on accepting further applications for shale gas exploration rights, or any consideration and approval on pending applications until such time as an investigation of the impacts could be concluded, was welcomed," he said.

"Regrettably, the minister's task team's mandate, objectivity and independence have already been brought into question and this has not been aided by the minister's lack of transparency and refusal to disclose the task team's requested information."

Fracking can be worth billions

Moratorium on work in the Karoo is under fire

TSHEPO MASHEGO

SOUTH Africa stands to gain billions of dollars worth of economic activity and generate tens of thousands of jobs if it unlocks the potential of shale gas in the Karoo basin.

However, this is premised on sound management as the process to access this gas — hydraulic fracturing or fracking — is still relatively novel and can present environmental dangers.

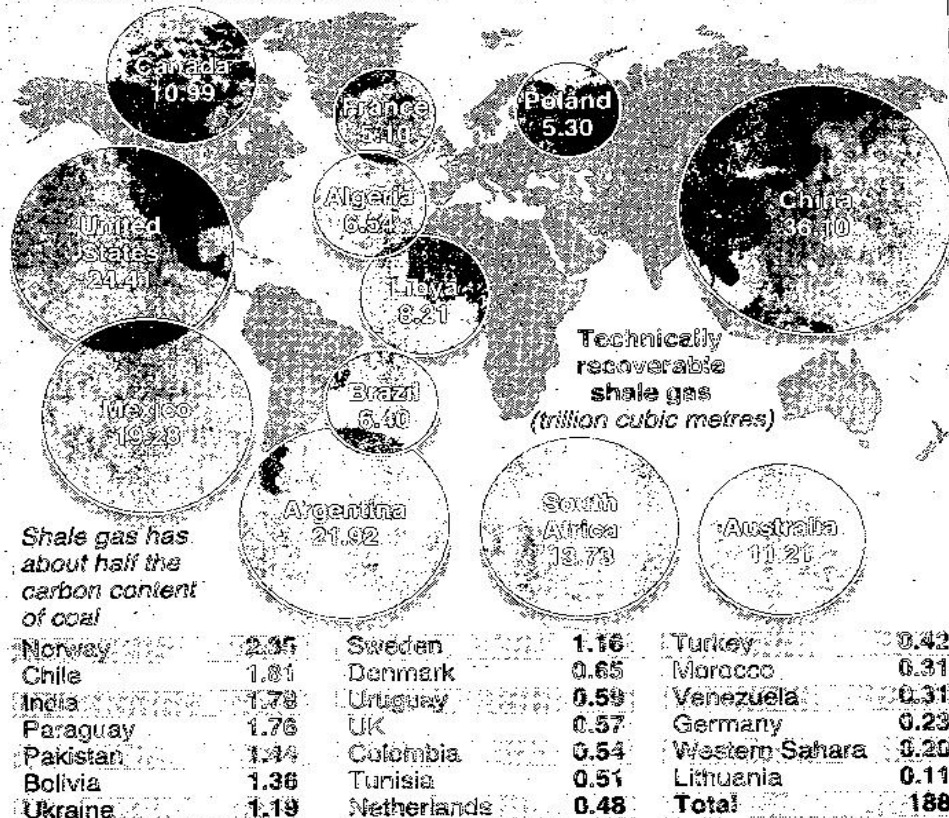
This was according to Danie Vermeulen, a doctor in geohydrology at the University of Free State's Institute of Groundwater Studies, speaking at the University of the Witwatersrand this week.

Vermeulen, fresh from a trip to Pennsylvania in the US, said if South Africa adopted some of the strategies used by that state, the country would be able to benefit from shale gas and limit its effects on the environment.

He said the South African government's moratorium on fracking in the Karoo Basin was misjudged as it would prevent scientists from experimenting and establishing baselines regarding the effects of fracking.

The "shale gale" natural gas revolution

The development of shale gas could transform world energy options, boosting global gas reserves by more than 40%, significantly lowering carbon emissions and creating a range of new uses for natural gas



Shale gas has about half the carbon content of coal

Natural gas (global technically recoverable gas resources)

453 trillion cubic metres

Shale gas: 188 trillion cubic metres

Sources: U.S. Energy Information Administration

© GRAPHIC NEWS

"There are no experts in the field of hydraulic fracking in South Africa. We need to be given that opportunity to experiment and establish a knowledge base about fracking in South Africa. That is why academics like myself are against the government moratorium," Vermeulen said.

The key environmental concern expressed by anti-fracking activists is its impact on water, but Vermeulen said the threat of fracking fluids seeping into underground water was minimal as there was a substantial distance between aquifers and shale gas.

Vermeulen said shale gas was an abundant and affordable source of energy and the cleanest-burning fossil fuel.

"If the reserves of shale

gas are proven to be commercial, this will be a game changer for South Africa," he said.

The National Planning Commission agreed. In a report it said: "Shale gas has the potential to contribute a very large proportion of South Africa's electricity needs."

According to the latest data from the US Energy Information

Administration, South Africa has the fifth-largest reserves of shale gas globally, tentatively measured at 485 trillion feet³.

Commercial exploitation of such a vast resource would dramatically change South Africa's energy landscape, as gas was ideal for electricity generation, Vermeulen said.

More jobs would be created, as fracking was a labour-intensive process. Vermeulen also presented figures showing that the average profit from a shale-gas well was \$100-million over its lifetime.

But the environmental drawbacks of the fracking process — in particular its need for water — had prevented the world from embracing the process wholeheartedly.

Vermeulen said it would take close to 4 000 truckloads of both water and sand to get a well up and running.

Another problem was the absence of a well-developed pipeline network, as an extensive trucking network would be needed to transport the water, sand and fracking fluid. Thus, the Karoo's tranquility would

surely be sacrificed to access the gas, Vermeulen said.

Accessing water in the Karoo was another issue of concern to activists, but Vermeulen said that if water were diverted from the Orange River, 1 800 wells could be drilled.

The desalination and transport of salt water would also be economical.

However, this debate could be moot within a few years as companies are already

experimenting with "dry-fracking", which, as its name suggests, does away with the need for water.

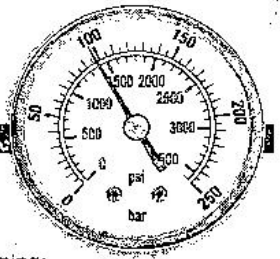
The geographic footprint of fracking wells was also extremely compact, Vermeulen said.

The area that was earmarked for fracking represented less than 1% of the total land area of the Karoo.



Fracking - game-changer in world energy markets

Hydraulic fracturing - also known as "fracking" - is a two-phase process to extract natural gas from prehistoric shalebeds thousands of metres below ground. The first phase includes drilling the wells, the second uses high-pressure blasts of water and sand-laden gel to fracture shale rock and release gas

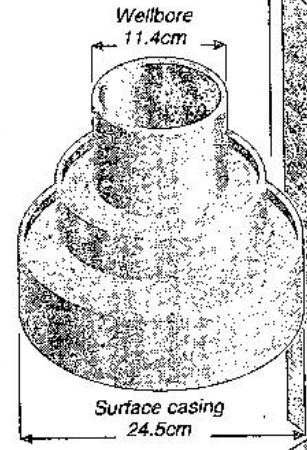


DRILLING PHASE

Drilling rig: Time to drill each well from *spud* - point of breaking ground - to *total depth (TD)* is about three to six weeks depending on depth and length of horizontal well. (Record for 4,000-metre well is 7.5 days)

Aquifer: Water-bearing rock is at average depth of 100 metres

Fresh water protection: Three sets of steel casings are cemented into place to prevent accidental pollution of drinking water aquifers

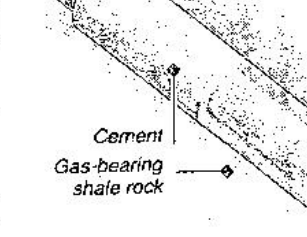


Shale layer: Rock formations are 1,000-2,500m underground:

Kick-off point: Drill turns horizontal, roughly 150m above shale. Horizontal section extends up to 3,000m

Wellbore: Steel pipe surrounded by cement

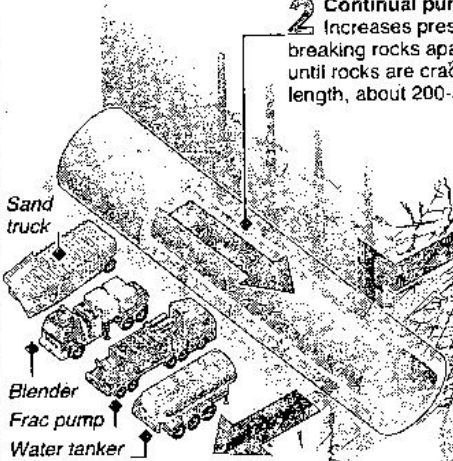
Jet perforation: Holes punched through wellbore, cement and adjacent rock by shaped explosive charges - similar to those used in anti-armour ammunition



End of drilling: Wellbore cleared of debris and drilling rig removed

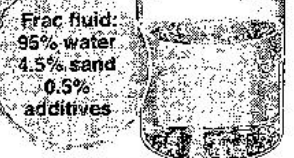
FRACKING PHASE

1 Hydraulic fracturing fluids: Water, sand and additives are pumped at extremely high pressure - over 100 bar, about 1,500 pounds per square inch (1,050kg/sq m) - down wellbore



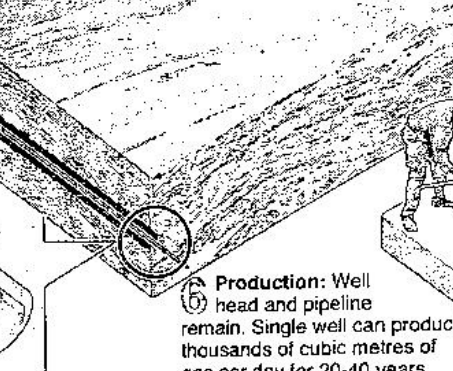
2 Continual pumping: Increases pressure of frac fluids in well, breaking rocks apart. Fracking continues until rocks are cracked to desired length, about 200-300m

3 Injection: Typically requires 20,000 cubic metres of water - equivalent to 500 tankers - plus 1,800 tonnes of sand, blended with 100 tonnes of additives to promote gelling.



4 Back-flushing: Frac wastewater pumped out of well for disposal or re-use

5 Gas flow: Sand remains, holding fractures open to allow gas to flow into well. Fracking process takes up to 10 days



6 Production: Well head and pipeline remain. Single well can produce thousands of cubic metres of gas per day for 20-40 years

Sources: Ground Water Protection Council, Exxon Mobil, Austin Exploration Limited

ANC trust stands to gain from fracking

BOBBY JORDAN

AN ANC trust established 20 years ago by Nelson Mandela and other struggle veterans stands to earn a potential fortune from shale gas exploitation in the Karoo.

The Batho Batho Trust has a 51% stake in Thebe Investments, the local empowerment partner of Shell SA. Thebe is well placed to benefit from an industry that could be worth an estimated \$200-billion (R1.6-trillion) should Shell succeed in a bid to tap the reservoir of natural gas beneath the Karoo.

Shell is one of several companies that have applied to the Petroleum Agency of South Africa (Pasa) for exploration rights in the Karoo.

The company confirmed its partnership with Thebe, but said it was too early to say exactly how its business would be structured should production go ahead.

Batho Batho Trust chairman Kenny Fihla this week confirmed the trust's 51% stake in Thebe Investments but said it was in no way involved in day-to-day business matters. He said the trust's donations to the ANC were in line with its specific transformation agenda. "We make no bones about the fact that we donate to the ANC — precisely because the trust was established by the president of the ANC at the time [Mandela]", said Fihla.

Batho Batho trustees include KwaZulu-Natal Health MEC Sibongiseni Mkhize, who did not respond to queries.

The prospect of the ANC benefiting from shale gas exploita-

tion prompted outrage from anti-fracking organisation Treasure the Karoo Action Group (TKAG). TKAG used the courts to force government to reveal the composition of its fracking task team, which is due to report back to Minister of Mineral Resources Susan Shabangu later this month. The task team must decide whether to recommend for or against fracking in SA.

Commenting on Shell's indirect link to the Batho Batho Trust, TKAG spokesman Jonathan Deal said: "TKAG have, since the ad-

*'The refusal of
Minister Shabangu to
furnish information
is now making sense'*

vent of the shale gas mining debate in early 2011, chosen to support and defend our government against frequent allegations that Shell has undue influence within the ANC, and that influence will be [or has been applied] by Shell in that company's application to mine shale gas in SA. Now that the extent of the ANC interest via Batho Batho Trust and Thebe Investments has been confirmed, we are naturally concerned that Shell is trading on this influence.

"In hindsight, the refusal of Minister Shabangu to furnish information until being compelled by a court order is now making sense. It would have been prudent of Shell and the government to volunteer this information at the outset of the shale

gas mining applications in SA, rather than waiting for the media to expose and highlight this."

TKAG is campaigning against the use of fracking, which it claims poses a threat to the environment, particularly scarce water resources.

Concern has also been raised about the involvement of ANC politician Chris Nissen in drumming up support for fracking in the Karoo. Nissen emerged as the spokesman for the Karoo Shale Gas Community Forum, which last year held discussions with Pasa. Nissen did not respond to queries.

Thebe Investments spokesman Saleem Symallin said while it is true that Thebe Investment Corporation has a 25% stake in Shell SA Refining and a 28% in Shell SA Marketing, "Thebe's investment is only in the downstream distribution arm of Shell SA and not in the upstream exploration businesses".

Confirming the shareholding, Shell spokesman Elton Fortuin said the company was years away from making a decision on whether to apply for a production licence. "This would depend on exploration efforts proving that the shale contains commercially producible gas volumes."

Fihla said Batho Batho insists that all trust beneficiaries commit themselves to using funds for transformation purposes.

"The overriding principle is that the trust will support the transformation of South African society and therefore we look at organisations, causes or projects that are aligned to that overall objective," Fihla said.

New technology of waterless fracking mooted

for SA

LONI PRINSLOO

A CANADIAN company claims it has developed technology for waterless fracking.

According to the company, GasFrac, the waterless fracking method, or gas fracking, involves a thick gel from propane or liquefied propane gas (LPG) being pumped down

the drill. The gel reverts to a vapour underground before it returns to the surface in a recoverable form.

GasFrac claims that the gel does not carry the chemicals used in drilling back to the underground water.

In light of the controversy and emotions surrounding the traditional method of hydraulic fracturing, which uses millions of litres of water to extract shale gas, this "cleaner" technology could be significant.

But Doug Bently, manager

of Schlumberger, the world's largest supplier of oil and gas products and services, said it is still unclear if this technology will work.

He said other clean options include using biodegradable chemicals. "We can offer

chemical cocktails that are fully biodegradable, if the client is willing to pay for them."

Commenting on waterless fracking at a conference hosted by the Fossil Fuel Foundation, Shava Mining's Andrew Kinghorn said that, according

to GasFrac, using LPG instead of water will result in higher yields and cut out the logistics of transporting millions of litres of water.

"Is this the answer to South Africa's fracking problems? Probably not, but it shows that there are other options that we need to explore," said Kinghorn.

Karoo shale must be explored

DANIE VERMEULEN

SINCE the energy giants Shell and Sasol first announced plans to explore for shale gas in the Karoo — which they say could help resolve South Africa's energy crisis — various interest groups have been embroiled in a furious war in the media.

The voice of opposition became so intense that government placed a moratorium on exploration for shale gas pending the issuing of a research report later this month on the merits and dangers of the hydraulic fracturing process, or fracking, required to release the shale gas.

As with any scientific decision, it is important to guard against being guided by emotion and to rather look at facts.

I have recently returned from a third study tour in America, the only country in the world where hydraulic fracturing is practised widely. As a scientist, I wanted to understand the underlying facts and, especially, the risks and if they can be mitigated.

It is estimated that South Africa has the fifth-largest shale gas reserve in the world — up to 485 trillion cubic feet (TCF). By way of comparison, the Moss gas project near Mossel Bay is fed by reserves of three TCF.

These calculations are based on data from 26 wells that were drilled 40 years ago by Soekor, the old South African

oil exploration company which today is part of PetroSA. If the gas can be extracted economically and in an environmentally friendly way, the shale gas reserves can help us tremendously with our growing energy needs.

But it is vital to understand that the actual extent of our reserves can only be confirmed through exploration.

Furthermore, exploration will allow us to understand the geological and water make-up of the Karoo. We already know that what makes South Africa's case unique is the presence of dolerite in the shale rocks but we need to know at what depth it can be found, and hence the extent to which it will affect the fracturing process, which takes place at depths of at least 3km beneath the surface.

We also do not know if the extreme heat and pressure associated with the intrusion of dolerite underground can partially destroy the carbon in such a way that gas is not readily available.

Once again, this can only be confirmed through exploration.

Water is the big challenge as hydraulic fracturing is a very thirsty process. About 20 000 cubic metres of water per borehole is used with every single fracturing of underground rock to release gas. That equates to about eight Olympic

swimming pools.

The Karoo is already dry, a semi-arid area with low rainfall. The region's water resources are only properly supplemented by major rainfalls, such as in 1974 and last year. So is there enough water for hydraulic fracturing?

In Texas in the US they build dams and pump water gradually from boreholes before fracking. Water supply is then sufficient, without underground water resources being severely tapped. After the fracking process, these dams and boreholes are at the local farmers' disposal.

Mpumalanga's coal will be exhausted in the next in 30 years

Some of the most senior geologists in South Africa believe there is enough water in the Karoo. I believe

thorough tests are needed to determine whether such views are correct.

Fans of the Karoo's desert plains are concerned that production platforms will disfigure the landscape. This is also unclear. Only a small part of the area for which licences are granted will be explored. Due to restrictions resulting from national parks, villages, farmsteads and the enormous Square Kilometre Array (SKA) telescope, only about 28% of the pending area can be explored. Indeed, the SKA is protected by national legislation, ensuring there is no activity around the development that

could affect its functioning or effectiveness.

Within this area, only places where the shale is thick enough for gas to be found, and where there is no dolerite, will be exploited. It is estimated that less than 15% of the exploration area will eventually be used.

But these are not the only questions. How much traffic will be on the roads? The answer is about 800 heavy vehicles for each well-pad, but only for the few weeks of the exploration. If the water is diverted to the various platforms via temporary pipelines, it decreases the number of vehicles by 500 per hole.

What about the economic boost? In America, not much work is created directly in local villages, but residents do benefit indirectly from the new infrastructure such as hospitals, schools and sports fields that is built by the exploration companies. More research about this is possibly required for South Africa.

The fact is that South Africa is short of energy.

Coal supply in Mpumalanga will be exhausted over the next 30 years and most power stations in Mpumalanga will close down.

All that remains is shale gas and nuclear power. Which one is the solution? Each one leaves behind a footprint.

● Vermeulen is director of the Institute for Groundwater Studies at the University of the Free State

Vollgraaff 2012: 1



1

ID: 04095512-01 Source Page: 1

Fracking gets green light

RENÉ VOLLGRAAFF

Exploration set to start, but it may be nine years before Karoo gas flows

CABINET's decision to give the nod to shale gas exploration opens the way for companies to apply for exploration rights and to test the extent of recoverable gas reserves in the Karoo.

However, it could take up to nine years before commercial volumes of shale gas flow from the Karoo, even if Minister of Mineral Resources Susan Shabangu gives the final green light for hydraulic fracturing (fracking) on Tuesday.

Collins Chabane, the Minister in the Presidency, announced at a briefing on Friday that the cabinet had endorsed the recommendations of a technical task team that the moratorium on applications for shale gas exploration in the Karoo be lifted.

The moratorium was imposed by the Department of Mineral Resources in April last year amid opposition from environmental groups and other stakeholders who claimed that fracking would harm the Karoo's environment and underground water resources.

The Department of Mineral Resources then set up a task team to study the plans for, and concerns about, shale gas exploration.

Fracking involves blasting sand and water laced with chemicals underground to free natural gas and oil from shale deposits.

The US Energy Information Administration (EIA) estimates the recoverable shale gas reserves in the southern Karoo area at about 485 trillion cubic feet (tcf). But this has not been proven due to the moratorium on exploration.

According to a study by

Econometrix, which was funded by Shell and released early this year, even if the extractable gas reserves are only 20 tcf (less than 5% of the EIA's estimate), exploitation would still bear major benefits for economic growth and job creation.

Janine Nel, spokesperson for Shell, said that once the moratorium was officially lifted Shell hoped to get exploration rights agreements.

"Once that is done, we need to gather geophysical data and do an environmental and social and health

'The first few wells will be simply to find out if there is gas and how much'

impact assessment. It will be two to three years before we even drill the first exploration well," she said.

"The first few wells will be simply to find out if there is gas and how much and whether there is enough gas that flows out easily to make it commercially viable."

Nel said the overall exploration and preparation period would be about nine years.

Chris Bredenhann, energy leader for PwC Southern Africa, said it would be a minimum of six or seven years before commercial gas production could commence.

"After exploration, development of gasfields would have

to be done, wells have to be drilled and gas-processing plants will have to be built," he said.

Sasol, which was awarded a technical co-operation permit to conduct desktop studies to assess shale gas potential in the Karoo, said it no longer held any licence in the region but would be monitoring the new developments with interest.

"We concluded an extensive technical study of the area and then decided not to pursue further exploration activities in the assigned area. The decision was based on sub-surface technical and operational considerations," Sasol said.

Jonathan Deal, chairman of the Treasure Karoo Action Group (TKAG), said the organisation knew the cabinet's decision would be in favour of lifting the moratorium. This was partly due to the support of shale gas exploration in minister Trevor Manuel's National Development Plan (NDP).

The NDP was adopted by the cabinet this week. It calls for "exploratory drilling to identify economically recoverable coal seam and shale gas reserves".

The NDP also says: "If gas reserves are proven and environmental concerns alleviated, then development of these resources and gas-to-power projects should be fast-tracked."

Deal said the TKAG did not see fracking for shale gas as the right choice for SA. Each month spent pursuing shale gas was stealing time from the pursuit of renewable

energy in SA.

He said the TKAG had no legal way to compel the government to keep the moratorium in place. The group's first legal action will come if and when exploration licences are issued.

Deal said the TKAG was ready to take the fight up to the Constitutional Court to prevent fracking.

Aside from the environmental concerns about shale gas exploration, there have also been fears that it might

adversely affect the Square Kilometre Array (SKA) telescope, as fracking could trigger earth tremors.

The Astronomy Geographic Advantage Act of 2007, which was meant to boost SA's bid for the SKA, gives the government a mandate to prohibit anything that harms astronomy in the SKA region.

Chabane said he understood from the task team's report that there would be a buffer zone between the shale gas exploration area

and the location of the SKA.

He said that, according to scientists, the buffer zone would be sufficient to ensure neither of the programmes would be affected negatively.

Norman Ndaba, director for energy at Ernst&Young, said the cabinet's decision was good news as the time and money spent simply to prove the reserves will benefit the economy.

The SA Chamber of Commerce and Industry said the potential environmental con-

sequences of fracking must be balanced against the economic benefits.

"Sacci supports the fact that companies that wish to undertake shale gas exploration will have to comply with the stringent SA environmental impact assessment standards," said chamber CEO Neren Rau.

Comment on this:
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www.timeslive.co.za

Appendix C

Article A

Drakensberg and surrounds face fracking threat too, conservationists warn

John Yeld. Environment & Science Writer

1. While proposed fracking for shale gas in the Karoo has drawn most of the local criticism of
2. this controversial extraction method, there is an equally serious threat to the Drakensberg
3. and surrounding mountainous areas in three provinces, conservationists are warning. And a
4. similar warning about the dangers of mining and oil-and-gas exploration and exploitation in
5. Africa has come from the International Union of Conservation of Nature (IUCN), which says
6. one in four of the continent's "iconic natural areas" are threatened by planned mining and oil-
7. and-gas projects. The IUCN, which advises the UN Educational, Scientific and Cultural
8. Organisation (Unesco) on World Heritage Sites in the "natural site" category, recently
9. expressed concern about the "rapidly increasing number of cases" where sites were
10. threatened by such projects, although it acknowledged that some major players had agreed
11. not to exploit these areas. Barkley East conservationist Kate Nelson, who runs local guestfarm
12. and adventure company, said that while many people knew of the anti fracking campaign
13. being run in respect of shale gas prospecting applications there, few were aware that large
14. parts of the Free State and Eastern Cape Highlands and Kwazulu-Natal were under a similar
15. threat. Prospecting permits had been granted to Anglo Coal and three-company consortium
16. consisting of Sasol and foreign energy giants Statoil and Chesapeake Energy, covering and
17. 88 000km² tract of land right around Lesotho – including the central and southern
18. Drakensberg regions of Kwazulu-Natal and the Eastern Cape Highlands. The consortium,
19. granted a one-year technical co-operation permit in November last year, was involved in a
20. desktop exploration study which did not involve any drilling at this stage, Nelson said.
21. "Nevertheless it's a situation that local residents need to monitor closely". The exploration
22. permits had been granted despite the Drakensberg being one of the country's top tourist
23. attractions and a proclaimed World Heritage Site. The uKhahlamba-Drakensberg Park was
24. added to the World Heritage List in November 2000, to help conserve both its natural scenic
25. beauty and biodiversity, and its rich cultural heritage in the form of San rock art. The Berg
26. was also a highly productive agricultural area and a vital source of clean water for large parts
27. of the country. "The Drakensberg "is South Africa's major watershed, with tributaries
28. supplying both the Atlantic and Indian Oceans. Any pollution of this region therefore
29. has the potential to impact on very large parts of the country's water supply," Nelson said.
30. "The fact that the Berg does have water potentially makes it more attractive for fracking
31. than the 'Karoo Heartland', and so it is potentially more viable for the oil-and-gas
32. exploration companies." Nelson said that local conservationists had raised their concerns
33. with the IUCN because the uKhahlamba- Drakensberg Park appears to be within the
34. prospecting region. "We are eagerly awaiting their response." In June, Tim Badman, director
35. of the IUCN's World Heritage Programme, described these sites as "exceptional places"
36. covering less than 1 percent of the Earth's surface. They have been included in the World
37. Heritage List because they are of outstanding value to all of humanity. It is the duty of every
38. one of us to cooperate in their protection and conservation. "That duty includes the
39. extractive industry." He acknowledged that some energy companies like Shell and the
40. financial services firm JP Morgan, as well as the International Council of Mining and Metals,

41. which brings together many of the world's major mining companies, had recognised the
42. importance of the conserving World Heritage Sites and had committed themselves to
43. avoiding any activities that would damage them.

Appendix D

Article B

Shell doing its best to make fracking safe, water friendly

Jan Willem Eggink

1. Some of you may have seen this image on television or the internet. A man reaches across to
2. turn on his kitchen tap. He takes a lighter and applies it to the stream of water, it burst into
3. flame. The flame is attributed to the presence of methane gas. It is a powerful image. But it
4. is important to be clear the source of the gas. While critics suggest natural gas drilling as the
5. cause, there is considerable evidence that dissolved methane can occur naturally in ground
6. water. Indeed, according to the department of Water Affairs, methane has been found in
7. shallow water wells in the Karoo. Confusion and misinformation about connection between
8. natural gas drilling and water supplies feeds into public concern about the safety and
9. environmental impact of shale gas production, and contributes to worries about the
10. exploration of natural gas in the Karoo. The public is right to demand high standards. For the
11. industry, there are two clear tasks at hand: first, we must continue to maintain the very
12. highest operational standards. At Shell, our efforts are underlined by a set of global onshore
13. shale gas operating principles that provide a framework for protecting water, air wildlife and
14. the needs of local communities. We support regulation that is designed to reduce risks to
15. the environment and keep those living near our operations safe. Second, we need to dispel
16. the significant misconceptions about shale gas production. I would like to address the main
17. misconception about shale gas, underlined by the fact that shale gas under the Karoo may
18. help South Africa to develop a secure and sustainable energy supply. We understand that
19. people have concerns about the issue and allegations raised by opponents of shale gas
20. extraction and we feel it's important to address these. The allegations have many factual
21. discrepancies and do not reflect Shells operations. One major misconception is that
22. hydraulic fracturing poses a significant risk to fresh water aquifers. A very recent report of
23. the US Energy Department that has been looking at potential health and environmental
24. implications of hydraulic fracturing confirmed that when a well was designed and
25. constructed correctly, ground water would not be contaminated. We think we need well-
26. targeted and strictly implemented regulation to preserve public confidence that the shale
27. gas revolution really is a force for good. We believe that protecting fresh water aquifers is
28. not difficult: the natural gas in some cases lies thousands of meters below aquifers. So it is
29. virtually impossible for liquid or indeed gas, to reach drinking water. Nevertheless, we
30. follow strict standards to ensure that wells are constructed correctly. We line our wells with
31. multiple steel or concrete barriers to prevent gas or liquid from leaking out of the well itself.
32. I should highlight that fracking has been successfully performed more than a million times in
33. the US alone over the past 60 years in vertical wells and more than 20 years in vertical wells.
34. We do not hydraulically fracture wells unless we have pressure tested the well bore for
35. integrity. Another criticism relates to water consumption and use. According to various
36. studies, including one by the renowned Massachusetts Institute of Technology in the US, the
37. water intensity of shale gas ranks among the lowest of all energy sources. We recognise that
38. in an arid area like the Karoo, even limited water use may be a concern. Again, sound
39. operational practices can address these concerns. Shell strives to avoid competing with local
40. water needs. We will not operate wells where isolation of our completion and production

41. activities from potable ground water cannot be achieved. And wherever possible, we use
42. non-potable water, including the recycling and reusing of water from our operations.
43. Nobody will go short of fresh water because of our operations; either in the exploration
44. phase or if there is any further development . This is a legally binding commitment. One
45. example of how we work with communities to find the best solutions for the water use is in
46. China's Shanxi province. Here we are developing the Changbei field, we funded the
47. construction of 240 underground water-storage tanks and 12 water-pumping stations,
48. providing about 3 000 people better access to drinking water. A third debate results partly
49. from a paper by Cornell University, which stoked fears that the greenhouse emissions from
50. shale gas far exceeded not only those from conventional gas, but even those from coal.
51. While we agree emissions from all energy sources need to be better understood, the
52. quickest and cheapest way to reduce emissions is to switch power generators from coal to
53. gas. The assumptions made in the Cornell paper stand in stark contrast to the International
54. Energy Agency (IEA) analysis, which found that, on a well to burner basis, emissions from
55. shale gas exceed those of conventional gas by as little as 3.5 percent in the best case
56. scenario and by 12 percent in the worst. Rigorous operations management helps to
57. get to the lower number. The IEA stated: "...total emission from (shale gas) production are
58. only slightly higher than for conventional gas: and both the water and climate impacts can
59. be mitigated using existing techniques". A conclusion recently backed up by a research
60. paper from Carnegie Mellon. In any event, shale gas-fired power still emits only about half
61. the CO₂ of coal-fired power, which was confirmed in the US National Energy Technology
62. Laboratory study comparing newest gas and coal technology. Some people disagree as to how
63. South Africa should meet its energy needs in future. We want to promote debate and have a
64. solid discussion based on facts and not misconceptions. At Shell we believe onshore
65. exploration and production can and must occur in an environmentally responsible manner.
66. Anything less is unacceptable. I know that this won't convince everybody. And we can never
67. have all the answers but our exploration activities will provide a large amount of answers to
68. the questions, whether the gas is there and can be produced commercially. We're
69. determined to be transparent and open about our proposals, and to address all concerns.

Appendix E

Article C

Greening the Future Awards. A watchdog with strong bite. Not-for-profit organisations award Winner: Treasure Karoo Action Group

Michelle Nel

1. Whatever the government decides about fracking in the Karoo, a small group of volunteers
2. has succeeded in broadening the debate about the controversy and showing what could
3. happen if it was allowed to go ahead. Fracking, or hydraulic fracturing, involves the injection
4. of a mixture of chemicals and water into deep shale rock formations to extract gas. Shell and
5. other energy companies have applied for exploration rights across more than 230 000km² of
6. the Karoo. Jonathan Deal, chairperson of the non-profit organisation Treasure the Karoo
7. Action Group, says fracking threatens to pollute scarce groundwater reserves in the semi-
8. desert area and the government should apply the precautionary principle before granting
9. any mining rights. Pressure from his and other environmental lobby groups forced the
10. government's hand in placing a moratorium on fracking last year and setting up a task team
11. to investigate shale gas extraction. The final report is due in July. "We oppose fracking until
12. it is proven that this is the best answer to South Africa's energy and employment needs,"
13. Deal said. "We are urging the government to refocus on renewable energy sources, which
14. are often forgotten in the rush to mine shale gas." The group was launched in January last
15. year and is staffed mainly by volunteers. Through research, media releases, brochures and
16. comics it has publicised the controversies surrounding fracking. "I do lots of presentations at
17. schools and warn the children that they will pay for their parents' bad decisions, so they just
18. get involved now," said Deal. He cannot fathom why the government is chasing fossil fuel:
19. "Saudi Arabia is oil-rich, yet it is moving to renewables. South Africa's solar irradiation levels
20. are 2.5 times higher than Saudi Arabia's. Along with Brazil, South Africa has the best usable
21. sunshine in the world, especially in the Northern and Western Cape." Deal, now semi-
22. retired, owns a farm in the Karoo, although it is not near the areas that could be affected by
23. fracking. His love for this arid landscape can be seen in his photographs in a coffee-table
24. book titled *Timeless Karoo*. The Treasure Karoo Action Group has developed on the back of
25. volunteer efforts. Initially self-funded by a core group, it is now increasingly supported by
26. public donations. "The environmental fight is long, lonely and costly," Deal said. "But had we
27. not begun this campaign, international giants would already be exploiting this resource in
28. spite of not fully understanding the technology or its impacts." The Greening judges said,
29. even if the group did not succeed in stopping fracking, it had helped to make sure it would
30. happen in a more responsible way. "This kind of campaigning civil society watchdog is
31. exactly what South Africa needs right now. With the national planning commission leaning
32. towards fracking, we could be heading for an interesting showdown," they said.

Appendix F

Article D

Karoo shale must be explored

D. Vermeulen

1. Since the energy giants Shell and Sasol first announced plans to explore the Shale gas in the
2. Karoo - which they say can help resolve South Africa's energy crisis - various interest groups have
3. been embroiled in a furious war in the media. The voice of the opposition became so intense that
4. government placed a moratorium on exploration of shale gas pending the issuing of a research
5. report later this month on the merits and dangers of the hydraulic fracturing process, or fracking,
6. required to release the shale gas. As with many scientific decisions, it is important to guard against
7. being guided by emotion and to rather look at facts. I have recently returned from a third study
8. tour in America, the only country in the world where hydraulic fracturing is practised widely. As a
9. scientist, I wanted to understand the underlying facts and, especially, the risks and if they can be
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15. shale gas reserves can help us tremendously with our growing energy needs. But it is vital to
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18. Karoo. We already know that what makes South Africa's case unique is the presence of dolerite
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32. South Africa believe there is enough water in the Karoo. I believe that thorough tests are needed
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37. only 28% of the pending area can be explored. Indeed, the SKA is protected by national
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51. director of the Institute for Groundwater Studies at the University of the Free State.