63 Hout Street,

Mercantile Building,

Cape Town, 8000,

South Africa.

Tel: +27 21 426 1633

Jacqueline Rukanda

Programme Officer

Email:
jacqueline@naturaljustice.org
allan@naturaljustice.org
janice@naturaljustice.org
alois@naturaljustice.org

TO: The Director-general: Department of Forestry, Fisheries and Environment

ATTN: Dr. Dee Fischer
Private Bag X447
Pretoria
0001

BY EMAIL: dfischer@dffe.gov.za

DATE: 25 August 2022

RE: COMMENTS ON THE PROPOSED REGULATIONS PERTAINING TO THE EXPLORATION AND PRODUCTION OF ONSHORE OIL AND GAS REQUIRING HYDRAULIC FRACTURING

NATURAL JUSTICE COMMENTARY ON THE PROPOSED REGULATIONS PERTAINING TO THE EXPLORATION AND PRODUCTION OF ONSHORE OIL AND GAS REQUIRING HYDRAULIC FRACTURING GAZEETED NO. 47112 OF 11/JUL/2022

PART 1: INTRODUCTION

1. We, Natural Justice, are a registered South African non-profit organization.
2. We submit to the Department of Forestry, Fisheries and Environment, the following comments regarding the ***Proposed Regulations Pertaining to the Exploration and Production of Onshore Oil and Gas Requiring Hydraulic Fracturing*** ("the Regulations"), introduced on 11 July 2022.
3. Our Commentary is set out as follows: introduction on Natural Justice, general comments, specific comments, and a conclusion.
4. Our comment also refers to the *Proposed Minimum Information Requirements For The submission of applications for an authorisation, right, permit or license for the onshore exploration of oil and gas intending to utilise hydraulic fracturing* ("the MIR"). We have submitted specific comments regarding the MIR to the Department on 22 August 2022.
5. We extend our gratitude to the Portfolio Committee of the Forestry, Fisheries and Environment, for the opportunity to comment on this Regulation.
6. While we applaud the Minister for introducing the Regulations and attempting to provide oversight on hydraulic fracturing projects in South Africa, we are deeply concerned that the Regulations as proposed, fall far short international best practice in the regulation of hydraulic fracturing "fracking".
7. We also are deeply concerned that the continued exploration of oil and gas (which these regulations seek to enable and fast track) undermine South Africa's commitments toward biodiversity protection and climate actions.
8. To support this statement, we attach to this commentary, a profession expert opinion from Dr Lawrence D. Meckel III, a scientist and a technical and managerial expert in the energy industry. You will notice from the report that Dr Meckel concludes that the Regulations as they stand, are insufficient - falling short of international best practice regulating fracking activities in several countries where the industry is matured and has been practiced for long.

PART 2: NATURAL JUSTICE: Lawyers for Communities and the Environment

9. **NATURAL JUSTICE** is a non-profit organization, registered in South Africa in 2007. Our vision is the conservation and sustainable use of biodiversity through the self-determination of indigenous peoples and local communities.
10. Our mission is to facilitate the full and effective participation of Indigenous peoples and local communities in the development and implementation of laws and policies that relate to the conservation and customary uses of biodiversity and the protection of associated cultural heritage.

11. Natural Justice works at the local, national, regional, and international levels with a wide range of partners. We strive to ensure that community rights and responsibilities are represented and respected on a broader scale and that gains made in international fora are fully upheld at lower levels.
12. Natural Justice wishes to submit its comments to the Department of Forestry, Fisheries and Environment. We further express our request to make a verbal submission or participate in any meaningful engagements with the Department when an opportunity arises.

PART 3: GENERAL COMMENTS

3-1 Contradictions between hydraulic fracturing and South Africa's climate crisis commitment

Natural Justice is deeply concerned that the promulgation of the Regulations indicates that the government of South Africa intends to pursue plans to continue oil and gas exploration in South Africa, at the expenses of potentiality to develop sustainable and renewable energy alternatives.

13. The United Nations Intergovernmental Panel on Climate Change (IPCC) emphasized that the world needs to reduce emissions by 45 percent by 2030 and reach net zero by 2050 to avoid the worst outcomes of the climate crisis and avoid wholesale collapse of ecosystems. Three major reports of the IPCC findings have been produced which state that:
    a. August 2021 - a "code red for humanity," warning of irreversible changes to planetary support systems that in some cases, have already begun.
    b. February 2022 – a review of the ecological limits of the natural world together with the vulnerabilities and capacities of human societies to adapt to climate change. It noted that at present some irreversible ecological impacts are already underway, and that climate change has already pushed some natural and human systems beyond their ability to adapt. Climate change has already harmed public health, undermined food security globally, and has left approximately 3.3 to 3.6 billion people living in contexts that are highly vulnerable.
    c. April 2022 - focused on mitigation, made clear that the window to averting runaway, irreversible climate impact is rapidly closing. To prevent global warming from exceeding 1.5o C—after which severe harm will accelerate—rising emissions must end before 2025. The IPCC gave a clear warning to fossil fuel investors that future fossil fuel assets will become stranded if governments act in accordance with the scientific advice to avert the climate crisis.[1]
14. South Africa has been developing policies to shift its development pathway actively and progressively to increased sustainability, fostering climate resilience and lowering greenhouse gas emissions development.
15. For instance, South Africa has ratified the United Nations Framework Convention on Climate Change ("UNFCCC") and the Paris Agreement, which places obligations to meet emission targets and carbon budgets within specified time periods. To fulfil its obligations under the UNFCC

[1] United Nations Development Program, "Climate Action Summit: A Joint Appeal from the UN System to the Secretary-General's Climate Action Summit," May 10, 2019, https://www.undp.org/content/undp/en/home/newscentre/speeches/2019/climate-action-summit.html.

agreement, South Africa has further committed to implement interventions to address climate change based on science, equity and inclusivity.[2]

16. Recently, in September 2021, South Africa updated and enhanced its nationally determined contribution (NDC)[3] meeting its obligation under the Paris Agreement[4]. The updated NDC specifically intends to limit Green House Gas ("GHG") emissions to 398-510 MtCO2e by 2025, and to 350-420 MtCO2e by 2030, significantly lower than its previous target in 2016.
17. Additionally, at the 2021 United Nations Climate Change Conference ("COP26") in November 2021, the governments of South Africa, with France, the EU, UK, US and Germany launched an ambitious, long-term Just Energy Transition Partnership ("JETP") to support South Africa's de-carbonization and the transitioning of its economy towards renewable energy sources.
18. Specifically, JETP notes that in order to limit the impacts of climate change, the international community needs to collectively halve global GHG emissions by 2030 and achieve global net zero CO2 emissions by 2050, while strongly reducing other GHG emissions.
19. Despite these policy commitments and the availability of published and peer reviewed scientific research, the Minister's plan to allow hydraulic fracturing as a method to extract oil and gas onshore is a clear departure from these commitments.
20. Not only is shale gas production not a renewable source of energy, but fugitive emissions have also been a historic and ongoing concern in hydraulic fracturing. Concerns relate to fugitive gases' impact on groundwater resources and air quality as a pollutant, and their contribution to GHG emissions. Methane, a well-known fugitive gas escaping to the atmosphere during shale gas production, is a powerful greenhouse gas.
21. The United Nations Environment Programme (UNEP)'s latest Global Methane Assessment Report (2021), acknowledges that global methane emissions are fueled by human activities such as fossil fuels (accounting for 35%), waste (accounting for 20%) and agriculture (accounting for 40%). In the category of fossil fuels, oil and gas exploration contribute the most at 23% compared to other fuels such as coal.3 The report also clearly states that any further expansion in the usage of natural gas or related infrastructure is incompatible with the goal of ensuring global emissions fall under 1.5° C. Greenhouse gas emissions will not only undermine and contradict South Africa's commitments but will also implicate climate change actions in the region.
22. To stay within a 1.5 °C carbon budget by 2050, nearly 60% of oil, 90% of fossil methane gas, and 90% of coal must remain untapped. This represents a significant increase in unextractable estimates for a 2 °C carbon budget, especially for oil, where an additional 25% of reserves must be left untapped.
23. The window to harness carbon emission is quickly closing. The proposed regulations must not be promulgated.

3-2 General Comment on Seismic Activity Induced by Hydraulic Fracturing

24. The Human-Induced Earthquake Database (HiQuake), the largest and most up-to-date database of earthquake sequences proposed to have been induced or triggered by human activity, has

[2] Presidential Climate Commission INDC.

[3] South Africa First Nationally Determined Contribution Under the Paris Agreement, updated September 2021, https://unfccc.int/sites/default/files/NDC/2022-06/South%20Africa%20updated%20first%20NDC%20September%202021.pdf.

[4] Article 4.9 of the *Paris Agreement.*

documented 1,239 projects with reported induced seismicity as of 15 August 2022—one third of which were fracking projects[5]. In the United States, for example, "Scientists have documented an astronomical rise in seismic activity across the central and eastern United States, linking it to wastewater pumped into the ground from burgeoning oil and gas production."[6] The seismic activity caused by hydraulic fracturing can cause significant damage to property and infrastructure, and this damage has led to a flood of litigation in countries with longer histories of hydraulic fracturing[7]. It also leads to depreciation in property values in areas where hydraulic fracturing takes place[8].

25. Conclusive evidence from the United States of America, and growing studies in China, Canada and the UK has proved that fracking causes earthquakes and seismic activity. Their frequency, occurrence and strength cannot be estimated[9]. Research conducted by Thomas Goebel in California finds that oilfield waste injection is linked to earthquakes near the San Andreas Fault.[10]

3-3 Health Risks Induced by Hydraulic Fracturing

26. Significant concerns were raised about the toxicity of hydraulic fracturing fluids (including flowback water and wastewater) and potential risk to humans and the environment.
27. Hydraulic fracturing uses over 1000 different chemicals, many of which are harmful to human health—including harm to the nervous, respiratory and immune systems[11]—and some of which are known to cause cancer.[12] Unconventional oil and gas development, including hydraulic fracturing, releases chemicals which have been linked to cancer and childhood leukemia.[13] Fracking sites in particular release air pollutants that can cause severe headaches, asthma symptoms, cardiac

[5] The Human-Induced Earthquake Database (HiQuake), (2022) https://inducedearthquakes.org/

[6] Julia Rosen, "Pumped up to rumble: Massive studies of wastewater injection wells show fast pumping raises earthquake risk" (2015), thttps://www.science.org/doi/full/10.1126/science.348.6241.1299

[7] *See, e.g.,* Reuters, "Dutch Court Says Gas Producer Must Compensate Homeowners in Quake Zone" (2015), https://www.nytimes.com/2015/09/03/business/international/dutch-court-says-gas-producer-must-compensate-homeowners-in-quake-zone.html?_r=0; Blake Watson, "Hydraulic Fracturing and Tort Litigation: A Survey of Landowner Lawsuits" (2017), https://www.americanbar.org/groups/real_property_trust_estate/publications/probate-property-magazine/2017/september_october_2017/ppv31-5-article-hydraulic-fracturing-and-tort-litigation-landowner-lawsuits/

[8] Stephen Gibbons, Stephan Heblich, and Christopher Timmins, "Market tremors: Shale gas exploration, earthquakes, and their impact on house prices," *Journal of Urban Economics* (2020), https://www.sciencedirect.com/science/article/pii/S009411902030084X#bib0046

[9] Compendium of Scientific, Medical, and Media Findings Demonstrating Risks and Harms of Fracking and Associated Gas and Oil Infrastructure (Eighth Edition)," April 2022, http://concernedhealthny.org/compendium/.

[10] Thomas H. Goebel and Manoochehr Shirzaei, "More than 40 Yr of Potentially Induced Seismicity Close to the San Andreas Fault in San Ardo, Central California," Seismological Research Letters 92, no. 1 (2021): 187–98, https://doi.org/10.1785/0220200276.

[11] https://www.nrdc.org/issues/reduce-fracking-health-hazards#:~:text=Fracking%20sites%20release%20a%20toxic,are%20known%20to%20cause%20cancer.

[12] https://www.nrdc.org/issues/reduce-fracking-health-hazards#:~:text=Fracking%20sites%20release%20a%20toxic,are%20known%20to%20cause%20cancer.

[13] Cassandra J. Clark et al, *Unconventional Oil and Gas Development Exposure and Risk of Childhood Acute Lymphoblastic Leukemia: A Case-Control Study in Pennsylvania, 2009-2017,* Environmental Health Perspectives (2022), available at https://ehp.niehs.nih.gov/doi/10.1289/EHP11092

problems, and birth defects.[14] For example, a recent study of children in Pennsylvania, USA living near unconventional oil and gas developments at birth found that these children were two to three times more likely to be diagnosed with leukemia between ages 2 and 7 than those who did not live near such oil and gas developments.[15]

28. Additionally, a Canadian study by Caron-Beaudoin et al. (2017) reported increased levels of a benzene biomarker (t,t-MA) in the urine of pregnant women in Northeast British Columbia with a median concentration 3.5 times higher than other Canadians.
29. It is vital the comprehensive report published by the Physicians for Social Responsibility (PSR) detailing the risks and harms associated with hydraulic fracturing and attached to this commentary be considered by the Minister before finalizing the Regulations[16].
30. PSR strongly warns that their research has found "***no evidence that [hydraulic fracturing] can be practiced in a manner that does not threaten human health directly or without imperiling climate stability upon which human health depends.***"
31. The report details serious and irreversible negative impacts of hydraulic fracturing. In summary, it states that:
    a. Fracking creates flowback fluids made up of a combination of the original fracturing fluids used in the drilling process, many of which are toxic chemicals, water and hazardous materials brought out of the earth during the process, such as endocrine disruptors, carcinogens, and radioactive ions[17]. Chemical combinations and transformations underground also create new waste compounds that are just beginning to

[14] https://www.nrdc.org/issues/reduce-fracking-health-hazards#:~:text=Fracking%20sites%20release%20a%20toxic,are%20known%20to%20cause%20cancer.

[15] Cassandra J. Clark et al, *Unconventional Oil and Gas Development Exposure and Risk of Childhood Acute Lymphoblastic Leukemia: A Case-Control Study in Pennsylvania, 2009-2017*, Environmental Health Perspectives (2022), available at https://ehp.niehs.nih.gov/doi/10.1289/EHP11092

[16] Compendium of Scientific, Medical, and Media Findings Demonstrating Risks and Harms of Fracking and Associated Gas and Oil Infrastructure (Eighth Edition)," April 2022, http://concernedhealthny.org/compendium/.

[17] Martin Elsner & Kathrin Hoelzer, *Quantitative survey and structural classification of hydraulic fracturing chemicals reported in unconventional gas production*, 50 ENVIRON. SCI. TECHNOL. 3290–3314 (2016), https://doi.org/10.1021/acs.est.5b02818; Cloelle Danforth et al., *An integrative method for identification and prioritization of constituents of concern in produced water from onshore oil and gas extraction*, 134 ENVIRONMENT INTERNATIONAL 105280 (2020), http://www.sciencedirect.com/science/article/pii/S0160412019319907; Samuel J. Maguire-Boyle & Andrew R. Barron, *Organic compounds in produced waters from shale gas wells*, 16 ENVIRON. SCI.: PROCESSES IMPACTS 2237–2248 (2014), http://pubs.rsc.org/en/content/articlelanding/2014/em/c4em00376d; U.S. ENVIRONMENTAL PROTECTION AGENCY, OFFICE OF RESEARCH AND DEVELOPMENT, *Hydraulic Fracturing for Oil and Gas: Impacts from the Hydraulic Fracturing Water Cycle on Drinking Water Resources in the United States* 666 ES-42 (2016), https://cfpub.epa.gov/ncea/hfstudy/recordisplay.cfm?deid=332990.

be identified[18]. Many of the chemicals identified in these wastes have unknown toxicity profiles[19].

b. Spills and leaks of methane and other toxins from fracking wastewater into waterways have caused immediate fish kills and distress by dropping water pH[20], with effects on fish populations lasting years[21]. This makes onshore drilling and fracturing and subsequent wastes and spills a danger to marine life.

3-4 Hydraulic Fracturing Water Quantity

32. The increased activity in hydraulic fracturing has caused a significant increase of the volume of water required for the makeup of fracturing fluid, and, concomitantly, the disposal of the recovered fracturing fluid.
33. The use of large quantity of water exacerbates the existing water insecurity in South Africa.
34. Though it may be impractical to obtain a solid understanding of the volume needed and disposal requirements prior to commencing any hydraulic fracturing work, an inventory should be carried out on how much wastewater is currently being stored by various operators, how much is being produced yearly, and what the actual disposal capacity of the various identified disposal formations are.
35. The Regulations must impose provisions related to recycling and reuse of water, not only to reduce water use, but also to reduce the volume of wastewater being produced.
36. The current Regulations lack policy and process for: 1) non-producer re-use facilities, and 2) emerging technologies for treated water release to surface. In view of the latter, carefully designed baseline studies must be completed prior to moving ahead with this or other similar proposed schemes.

3-5 Hydraulic Fracturing Waste

37. Fracking operations generate large volumes of hazardous waste. The US EPA estimated that in 2016, some 4136 million tonnes of waste were generated by hydraulic fracturing in the United

[18] Kathrin Hoelzer et al., *Indications of transformation products from hydraulic fracturing additives in shale-gas wastewater*, 50 ENVIRON. SCI. TECHNOL. 8036–8048 (2016), https://doi.org/10.1021/acs.est.6b00430 (last visited Jun 12, 2020); Marika Nell & Damian E. Helbling, *Exploring matrix effects and quantifying organic additives in hydraulic fracturing associated fluids using liquid chromatography electrospray ionization mass spectrometry*, 21 ENVIRON. SCI.: PROCESSES IMPACTS 195–205 (2019), http://pubs.rsc.org/en/content/articlelanding/2019/em/c8em00135a.

[19] Cloelle Danforth et al., *An integrative method for identification and prioritization of constituents of concern in produced water from onshore oil and gas extraction*, 134 Environment International 105280 (2020), http://www.sciencedirect.com/science/article/pii/S0160412019319907.

[20] Diana M. Papoulias & Anthony L. Velasco, *Histopathological Analysis of Fish from Acorn Fork Creek, Kentucky, Exposed to Hydraulic Fracturing Fluid Releases*, 12 SENA 92–111 (2013), https://bioone.org/journals/Southeastern-Naturalist/volume-12/issue-sp4/058.012.s413/Histopathological-Analysis-of-Fish-from-Acorn-Fork-Creek-Kentucky-Exposed/10.1656/058.012.s413.full (last visited Jun 9, 2020).

[21] Christopher James Grant et al., *Fracked ecology: Response of aquatic trophic structure and mercury biomagnification dynamics in the Marcellus Shale Formation*, 25 ECOTOXICOLOGY 1739–1750 (2016), https://doi.org/10.1007/s10646-016-1717-8 (last visited Jun 8, 2020).

States[22]. The agency acknowledged this is likely an underestimate given the growing volumes of water used in fracking and length of the wells[23]. This figure includes some 4038 million m3 of wastewater -- or some 1,615,200 Olympic swimming pools filled with wastewater[24]. Treatment of this water then yields some 70 million tonnes of toxic solids[25]. About 25 million additional tonnes of solid waste created by drilling mud and drill cuttings also must be managed[26]. While South Africa's fracking operations are unlikely to reach this scale, even a single well using hydraulic fracturing can produce between hundreds and thousands of tonnes of waste that requires special disposal processes, meaning that the waste management challenge created by fracking quickly adds up as even exploration wells multiply.

38. The wastewater from hydraulic fracturing includes water from the formation that returns to the surface in the first few weeks to months after hydraulic fracturing, known as flowback, along with the water that comes back over the life of the well, known as produced water. Drilling also requires liquid "drilling muds" that ease the drill bit through the formations that also return to the surface and require disposal. Hydraulic fracturing's solid wastes are composed primarily by the earth removed by the drill bit, known as drill cuttings, as well as the scale that builds up in tanks and pipes of solids precipitating out of the wastewater.
39. These wastes contain hazardous materials, including toxic chemicals used in the drilling process and hazardous materials brought out of the earth during the fracking process, including endocrine disruptors, carcinogens, and radioactive ions[27]. Chemical combinations and transformations

[22] U.S. Environmental Protection Agency, Office of Research and Development, Management of Exploration, Development, and Production Wastes: Factors Informing a Decision on the Need for Regulatory Action 3–11 (2019), https://www.epa.gov/sites/production/files/2019-04/documents/management_of_exploration_development_and_production_wastes_4-23-19.pdf.

[23] Id. at 3–11.

[24] Id. at 3–11.

[25] Id. at 3–11.

[26] Id. at 3–11.

[27] Martin Elsner & Kathrin Hoelzer, Quantitative survey and structural classification of hydraulic fracturing chemicals reported in unconventional gas production, 50 Environ. Sci. Technol. 3290–3314 (2016), https://doi.org/10.1021/acs.est.5b02818; Cloelle Danforth et al., An integrative method for identification and prioritization of constituents of concern in produced water from onshore oil and gas extraction, 134 Environment International 105280 (2020), http://www.sciencedirect.com/science/article/pii/S0160412019319907; Samuel J. Maguire-Boyle & Andrew R. Barron, Organic compounds in produced waters from shale gas wells, 16 Environ. Sci.: Processes Impacts 2237–2248 (2014), http://pubs.rsc.org/en/content/articlelanding/2014/em/c4em00376d; U.S. Environmental Protection Agency, Office of Research and Development, Hydraulic Fracturing for Oil and Gas: Impacts from the Hydraulic Fracturing Water Cycle on Drinking Water Resources in the United States 666 ES-42 (2016), https://cfpub.epa.gov/ncea/hfstudy/recordisplay.cfm?deid=332990.

underground also create new waste compounds that are just beginning to be identified[28]. Many of the chemicals identified in these wastes have unknown toxicity profiles[29].

40. These hazardous wastes can contaminate the air, soil, and water if they are not stored, transported, treated, and disposed of properly, separately from other waste streams. They contain hydrocarbons that emit volatile organic compounds (VOCs), including known carcinogens like benzene and formaldehyde, into the air, along with radioactive elements. Their high salt content, heavy metals, and radioactive materials also contaminate soils and surface water if spilled and are harmful to humans and wildlife alike. Standard wastewater treatment centers are not able to treat fracking wastewater due to both the high salt content and the concentration of radioactive material. Both must be removed from the water with special filtration processes that result in radioactive solids that must be disposed of in special sites for these products.

3-6 Disadvantages of gas industry related to hydraulic fracturing far outweigh the benefits

41. The PSR report also states that oil and gas companies promote the narrative that hydraulic fracturing creates jobs, alleviates poverty, but evidence from their research shows otherwise.[30]
42. A case study of North Dakota in 2012, (USA) to illustrate that fracking industry costs far outweigh benefits was carried out by the Centre for Biological Study. Their study showed that heavy truck traffic associated with fracking in North Dakota caused extensive damage to state roads. The study further showed that drilling and fracking a single well requires more than 1,000 trips, and the state needed approximately $7 billion over the next 20 years to maintain local roads. [31] This is a huge public debt that will burden taxpayers, who will most likely benefit very little (if at all!) from the oil and gas industry.
43. South Africa is a country that is not only facing the climate crisis, but a multiple host of other crises such as rapid biodiversity loss, national energy and water crises, huge unemployment, political strife, widespread corruption and perpetual and historic inequality. The Regulations have not taken into account the biodiversity counterbalance biodiversity counterbalance is offset, and how the Biodiversity Action Plan will be implemented to restore lost biodiversity.
44. Government policies to address these multiple crises should not be created and implemented using a compartmentalized approach or in isolation of other essential parts of socio-economic and political context of the country. South Africa's 17 Sustainable Development Goals for 2030 include both goals to alleviate poverty and human health. There is undeniably a connected and related

[28] Kathrin Hoelzer et al., Indications of transformation products from hydraulic fracturing additives in shale-gas wastewater, 50 Environ. Sci. Technol. 8036–8048 (2016), https://doi.org/10.1021/acs.est.6b00430 (last visited Jun 12, 2020); Marika Nell & Damian E. Helbling, Exploring matrix effects and quantifying organic additives in hydraulic fracturing associated fluids using liquid chromatography electrospray ionization mass spectrometry, 21 Environ. Sci.: Processes Impacts 195–205 (2019), http://pubs.rsc.org/en/content/articlelanding/2019/em/c8em00135a.

[29] Cloelle Danforth et al., An integrative method for identification and prioritization of constituents of concern in produced water from onshore oil and gas extraction, 134 Environment International 105280 (2020), http://www.sciencedirect.com/science/article/pii/S0160412019319907.

[30] Compendium of Scientific, Medical, and Media Findings Demonstrating Risks and Harms of Fracking and Associated Gas and Oil Infrastructure (Eighth Edition)," April 2022, http://concernedhealthny.org/compendium/.

[31] Fracking in the United States: 10 Key Questions, Centre for Biological Diversity https://www.biologicaldiversity.org/campaigns/fracking/10_questions.html

existence between all human rights. Therefore, a holistic approach to meeting SDGs is required. For example, jobs cannot be enjoyed in the absence of a healthy and clean environment.

3-7 Hydraulic Fracturing negative impacts violate human rights

45. The negative impacts associated with hydraulic fracturing implicate the constitutional right to a clean and healthy environment (section 24), and by extension the right to life (section 11) right of access to sufficient food and water (section 27), right to just administrative action (section 33), access to information (section 32), amongst others.
46. As such the Regulations need to embrace a rights-based language and approach to preserve constitutional rights. As they stand the Regulations are not drafted to protect constitutional rights, but to accelerate oil and gas exploration. They also fail to embrace precautionary and preventative principles of environmental management as enunciated under NEMA.
47. In countries where hydraulic fracturing is now more well researched and better understood, the practice has been absolutely banned, in others – temporarily whilst others have placed moratoriums on fracking based on the precautionary principle.[32]
48. In the alternative, a phased and measured system of approval would allow for time to study and understand the impacts of fracking compared to an accelerated and wholesale licensing process.

3-8 American Petroleum Institute standards should not be used as the regulatory minimum standards

49. The American Petroleum Institute (API) is an industry group which represents nearly 600 companies involved in the production, refinement and distribution of petroleum resources. API's stated mission is, in part, "to influence public policy in support of a strong, viable U.S. oil and natural gas industry".[33] While API releases hydraulic fracturing standards to guide companies, these standards are created for the primary purpose of furthering the goals and interests of petrochemical companies. API standards should not be considered international best practice, and they certainly should not form the regulatory minimum standards as a matter of law. Simply adopting API standards as South Africa's own regulatory standards is allowing the industry to regulate itself and its own practices. This contradicts the purpose of regulating hydraulic fracturing and will lead to unsafe and harmful results, as it has already done in the United States.
50. API standards do not provide adequate protection for human and environmental health and safety. As just one example, the shortcomings of API standards for offshore oil and gas drilling were a primary cause of the 2010 BP Deepwater Horizon Oil Spill in the Gulf of Mexico, which killed 11 people, caused economic losses totaling tens of billions of U.S. dollars, and caused environmental harm that still persists today.[34] In the aftermath of the disaster, U.S. President Barack Obama created an independent national commission, the National Commission on the BP Deepwater

[32] Compendium of Scientific, Medical, and Media Findings Demonstrating Risks and Harms of Fracking and Associated Gas and Oil Infrastructure (Eighth Edition)," April 2022, http://concernedhealthny.org/compendium/.

[33] American Petroleum Institute, *Industry Mission*, available at: https://www.api.org/about/industry-mission

[34] National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling, *Report to the President* (2011), available at: govinfo.gov/content/pkg/GPO-OILCOMMISSION/pdf/GPO-OILCOMMISSION.pdf

Horizon Oil Spill and Offshore Drilling, to investigate and report on the causes of the spill in order to prevent such disasters from occurring again in the future.[35]

51. In its report to President Obama, the National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling stated that:
    - the API's inadequate standards "have undermined the entire federal regulatory system" and that reliance on these insufficient standards was a cause of the devastating 2010 BP Deepwater Horizon disaster:
    - ***API's ability to serve as a reliable standard-setter for drilling safety is compromised by its role as the industry's principal lobbyist and public policy advocate.***
    - ***API regularly resists agency rulemakings that government regulators believe would make those operations safer, and API favors rulemaking that promotes industry autonomy from government oversight.***[36]
    - ***API-proposed safety standards have increasingly failed to reflect "best industry practices" and have instead expressed the "lowest common denominator"—in other words, a standard that almost all operators could readily achieve.*** *Because, moreover, the Interior Department has in turn relied on API in developing its own regulatory safety standards,* ***API's shortfalls have undermined the entire federal regulatory system.***[37]
52. The inadequacy of API standards is not limited to the offshore oil and gas context. Hydraulic fracturing in the U.S. has led to cases of water contamination near fracking sites in numerous states, including Pennsylvania, Colorado, Texas, and Wyoming, despite the complicit companies' adherence to API standards.[38]
53. As the National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling described in the passages quoted above, API standards do not represent international best practice. Instead, they only adopt the industry's least common denominator—the standard that the most companies can meet—regardless of whether that standard provides sufficient protection for the environment or human health and safety. Further, API notoriously resists and undermines government efforts to implement regulations that are stricter than API's standards, even though such regulations are informed by science and provide better protection for human and environmental rights. Under no circumstances should the API standards be adopted as the regulatory baseline for South Africa's regulation of hydraulic fracturing. In light of the potentially

[35] National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling, *Report to the President* (2011), available at: govinfo.gov/content/pkg/GPO-OILCOMMISSION/pdf/GPO-OILCOMMISSION.pdf

[36] National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling, *Report to the President* (2011), page 225, available at: govinfo.gov/content/pkg/GPO-OILCOMMISSION/pdf/GPO-OILCOMMISSION.pdf (internal citations omitted) (emphasis added).

[37] National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling, *Report to the President* (2011), page 225, available at: govinfo.gov/content/pkg/GPO-OILCOMMISSION/pdf/GPO-OILCOMMISSION.pdf (internal citations omitted) (emphasis added).

[38] Sue Sturgis, *Gas indstry promotes own fracking standards despite history of problems*, Facing South (2012), available at: https://www.facingsouth.org/2012/02/gas-industry-promotes-own-fracking-standards-despite-history-of-problems.html

severe impacts on health and safety that result from hydraulic fracturing, API standards cannot be trusted to properly prevent or mitigate severe harm to human health and the environment.

PART 4: SPECIFIC COMMENTS

4-1 Chapter 1 – Definitions, Purpose and Application of Regulations

Section 1 - designated Agency

54. The Regulations designates the Petroleum Agency South Africa ("PASA") to be the designated agency under the Regulations responsible for granting various approvals prior to commencing any hydraulic fracturing work. Natural Justice submits that this designation is grossly inappropriate.
55. PASA is mandated to promote oil and gas in South Africa. Its core mandate poses a conflict of interest with ensuring compliance and Regulations of the environmental standards required by the *National Environmental Management Act* ("NEMA"). A regulator is required to be independent, impartial and objective and with respect, Natural Justice does not regard PASA as meeting these criteria.
56. Fracking is a fairly new industry in South Africa. It is questionable whether PASA has personnel that have the technical expertise, knowledge, competence and experience to effectively regulate and monitor compliance of the fracking industry. are not technically well equipped and suited to performing such functions.
57. According to the constitution's mandate, the Department of Environment, Forestry, and Fisheries is the appropriate and best equipped in terms of expertise to perform its constitutional mandate of regulating, monitoring and enforcing compliance for activities which impact the environment. Activities related to the petroleum industry are well known to affect the environment. Therefore, related regulation, monitoring and compliance should be left squarely with the constitutional mandate of the DEFF as the approving body for environmental authorization applications
58. An independent and impartial agency, not PASA should not only monitor, enforce compliance and report to the Minister in respect of compliance and regulation with such permits, but this impartial agency should also review and independently evaluate the conclusions of scoping reports, Environmental Impact Assessments (EIA), Environmental Management Plans/Programs (EMP/EMPrs), permit compliance conditions and advise the Minister accordingly. Such designation would maintain objectivity and ensure that the environmental issues raised during these exercises and application phases are monitored and reported rather than ignored.
59. Natural Justice urges the designation of the responsible agency to be the Department of Forestry, Fisheries and Environment, which is mandated to regulate and oversee compliance with environmental management. Alternatively, the designated agency should be an impartial entity that is not incentivized to promote oil and gas production.

4-2 Chapter 2 - Prohibitions

Section 5 - heritage sites as prohibited areas

60. The proposed regulations only prohibit hydraulic fracturing operations at heritage sites recognised by the National Heritage Resources Act (NHRA), Act No. 25 of 1999, but this prohibition should extend to all heritage resources, including cultural landscapes, sites connected to cultural practices

and other forms of living heritage, gravesites, and structures over 60 years old—regardless of their formal registration as heritage sites.

a. The term "heritage site" only encompasses a small subsection of the heritage resources that must be protected from the potentially devastating impacts of hydraulic fracturing. Instead, the regulations should prohibit hydraulic fracturing operations in and around areas containing heritage resources, which includes areas imbued with living heritage. Section 2(xviii) of the NHRA defines "heritage site" as "a place declared to be a national heritage site by SAHRA, or a place declared to be a provincial heritage site by a provincial heritage resources authority." This term is far narrower than the term "heritage resource." Section 2(xvi) of the NHRA defines "heritage resource" as "any place or object of cultural significance." This should be the term included in the proposed regulations—not only heritage sites.

b. The inclusion of protection for "heritage resources" in the prohibited areas section of the proposed regulations better aligns the proposed regulations with the objectives and requirements of the NHRA. Section 5(1)(a) of the NHRA states the following with respect to the necessity of protecting heritage resources generally (not only heritage sites):

> *(a) Heritage resources have lasting value in their own right and provide evidence of the origins of South African society and as they are valuable, finite, non-renewable and irreplaceable they must be carefully managed to ensure their survival;*[39]
>
> *(b) every generation has a moral responsibility to act as trustee of the national heritage for succeeding generations and the State has an obligation to manage heritage resources in the interests of all South Africans;*[40]

In order to achieve the objectives and meet the requirements of the NHRA, the proposed regulations must not limit their prohibition to heritage sites and must also provide protection for heritage resources.

c. The prohibition on hydraulic fracturing in areas which are or contain heritage resources must include living heritage. Living heritage—also called intangible heritage—is protected under the NHRA, and the proposed regulations must afford specific protection for living heritage. Section 2(xii) of the NHRA defines "living heritage" as follows:

> *"the intangible aspects of inherited culture, and may include—*
>
> *(A) cultural tradition;*
>
> *(B) oral history;*
>
> *(C) performance;*
>
> *(D) ritual;*

[39] National Heritage Resources Act (NHRA), Act No. 25 of 1999, section 5(1)(a).
[40] NHRA, section 5(1)(b).

(E) popular memory;

(F) skills and techniques;

(G) indigenous knowledge systems; and

(H) the holistic approach to nature, society and social relationships"

As described in further detail in the general comments above, hydraulic fracturing can damage ecosystems, cause seismic activity and earthquakes, and alter landscapes, and hydraulic fracturing leads to dust, noise, traffic, and vibrations. All these adverse impacts which accompany hydraulic fracturing operations will threaten living heritage in the areas in which hydraulic fracturing operations take place. Living heritage and cultural practices associated with ecological resources or landscapes will be damaged—potentially permanently. As such, the regulations must make specific provisions for the protection of living heritage.

d. The prohibited areas must also include those structures over 60 years old, which are protected from alteration or demolition by section 34 of the NHRA—independent of whether the structure has been designated a heritage site.
e. This also must include burial grounds and graves, which are protected under section 36 of the NHRA.
f. In summation, instead of only listing "heritage sites" as areas where hydraulic fracturing is prohibited, the regulations must prohibit hydraulic fracturing in "all areas which are heritage resources (including but not limited to registered heritage sites), areas on which heritage resources—including living heritage—are located, structures over sixty years old, and graves and burial sites."

61. The proposed regulations must include a buffer zone around the heritage resources described in the comment above. Even the localised impacts of hydraulic fracturing, including dust, noise, and vibrations, are not limited to the site on which operations take place. Other, non-localised impacts include ecosystem and water resource degradation—which may affect certain heritage resources—and induced seismic activity, which can lead to widespread, significant damage. Therefore, a large buffer zone must be included in the proposed regulations to ensure that no hydraulic fracturing operations have the potential to alter heritage resources in violation of the NHRA. Section 2(i) of the NHRA defines "alter" as "any action affecting the structure, appearance or physical properties of a place or object, whether by way of structural or other works, by painting, plastering or other decoration or any other means." Without a buffer, even the localised impacts of hydraulic fracturing will alter heritage resources in the surrounding area in violation of the objectives and requirements of the NHRA.

4-3 Section 4 and 5 -Need to expand prohibition of hydraulic fracturing in and around protected areas

62. The proposed regulations must include section 9(e) of the National Environmental Management: Protected Areas Act (NEM:PAA) in the list of prohibited areas. While subsections (a)-(d) are included among the prohibited areas, the regulations fail to include section 9(e): mountain catchment areas declared in terms of the Mountain Catchment Areas Act, 1970 (Act No. 63 of

1970). Especially considering the impact of hydraulic fracturing on the water resources and aquatic ecosystems, this section must also be included among the prohibited areas.

63. The prohibited areas should not only be limited to protected areas but should also include critical biodiversity areas (CBAs) and Ecologically or Biologically Significant Areas (EBSAs) in order to provide adequate ecosystem protection for important and sensitive terrestrial and marine ecosystems.
64. The regulations must include a buffer zone around the protected areas in which hydraulic fracturing is prohibited. Even the localised environmental impacts of hydraulic fracturing, including dust, noise, and vibrations, are not limited to the site on which operations take place. Other, non-localised impacts include widespread ecosystem and water resource degradation—which may affect protected areas and ecosystems—and induced seismic activity, which can lead to widespread, significant damage to the environment. All these environmental impacts necessitate a buffer zone between these protected areas and any hydraulic fracturing activities.

4-4 Section 5 - Need for 3km buffer zones around agricultural areas and all drinking water sources, including private boreholes

65. Hydraulic fracturing produces numerous hazardous compounds which can contaminate drinking water supplies and agricultural areas—with significant impacts on human health:

> *"Among numerous hazardous compounds, produced water may contain bromide, arsenic, strontium, mercury, barium, radioactive isotopes and organic compounds, particularly benzene, toluene, ethylbenzene and xylenes (BTEX). The sewage outflow, even from specialized treatment plants, may still contain critical concentrations of barium, strontium and arsenic. Evidence suggests that the quality of groundwater and surface water may be compromised by disposal of produced water. Particularly critical is the use of produced water for watering agricultural areas, where persistent compounds may accumulate. Air contamination can occur because of several HF-associated activities. In addition to BTEX, 20 HF-associated air contaminants are group 1A or 1B carcinogens according to the IARC. In the U.S., oil and gas production (including conventional production) represents the second largest source of anthropogenic methane emissions. High-quality epidemiological studies are required, especially considering recent observations of an association between childhood leukemia and multiple myeloma in the neighborhood of oil and gas production sites."*[41]

66. Because of the potential human health effects of the hazardous compounds produced from the hydraulic fracturing process, there must be a buffer zone between all hydraulic fracturing operations and any agricultural operations or water resources—not just strategic or municipal water resources.
67. Due to the hazardous compounds described above, which can cause contamination of water used for drinking and agriculture, a 3km buffer zone must be included between hydraulic fracturing operations (including produced water disposal) and any agricultural land or water supplies which are used for drinking or agricultural purposes. Approximately one in forty hydraulic fracturing sites

[41] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7225182/

has a chemical spill, and these spills are not the only type of contamination that can occur.[42] Chemicals used in the hydraulic fracturing process are able to migrate between 1km and 3km from the site.[43] In light of the hazards posed by the potential contamination, a 3km buffer zone is necessary to ensure the safety of nearby water supplies.[44] Therefore, a 3km buffer zone around *all* potable water resources and water resources used for agriculture must be included in the regulations.

Chapter 3 – Exploration or Production for onshore oil and gas

Section 6 (environmental obligations of applicant or holder of exploration or production right)

Fracking is a very harmful industry to the environment. It is essential that the regulations place strict requirements that after assessment, where harm is identified, the applicant should take preventative measures.

The wording in 6 (a) here is insufficient, where it requires applicant to "avoid" possible environmental impacts. Not only is the meaning ambiguous and indeterminate – but studies show that fracking has negative impacts that cannot be avoided. Instead, we propose replacing the word "avoid", with "prevent" – which is definitive, requiring positive action to be taken by applicant to prevent harm.

Chapter 5 – Operations and Management

Section 17 (1) and (2) fracturing fluids
Ambiguous terminology

68. Section 17 of the Regulations concerns "drilling fluid", which has not been properly defined by the Regulations. It is unclear whether "drilling fluid" refers to the same subject as "hydraulic fracturing fluid". We submit that each term must be clearly defined in the Regulation. Alternatively, if they refer to the same subject, they must not be used interchangeably.
69. Further, section 17(1) requires drilling operation must be undertaken using air, water, or water-based mud system, but it fails to define "water-based mud system". It is unclear whether any additive chemical is permissible in the water-based mud system and whether any chemical used in it is subject to the disclosure requirement under 17(2).
70. Additionally, the Regulations use both the terms "fracturing fluid" and "hydraulic fracturing fluid interchangeably". It is assumed that both terms refer to the subject. As such, we urge consistency in the legislation to provide further clarity.
71. Section 19 – Disclosure of information

Full public disclosure of drilling fluid

72. Assuming the terms "drilling fluid", "fracturing fluid," and "hydraulic fracturing fluid" all refer to the same subject, sections 14(4), 17, and 19(3) require a disclosure of proppant, base carrier fluid and each chemical additive to be used within the operation. However, the Regulations are unclear as to whether an applicant is obliged to disclose the exact composition, concentration, and volume of the chemicals used, or whether the disclosure of the additive's trade names are sufficient.

[42] https://waterinthewest.stanford.edu/news-events/news-insights/how-close-too-close-hydraulic-fracturing
[43] https://waterinthewest.stanford.edu/news-events/news-insights/how-close-too-close-hydraulic-fracturing
[44] https://waterinthewest.stanford.edu/news-events/news-insights/how-close-too-close-hydraulic-fracturing

73. The Regulations require that "The names of all drilling fluids must be submitted to the designated agency for approval prior to use" (s. 14(4)). Given that these fluids can be toxic and interact in ways harmful to the environment and human health within the formation, it is critical that the specific chemical formulations be provided to the agency. We submit that each Applicant must disclose the exact chemical composition, concentration, and volume of the additives used. Only a thorough and transparent disclosure of the chemicals released in the environment can facilitate meaningful waste treatment, as well as environmental and health risks assessment.
74. Moreover, the Regulations should also require that these be made available publicly, either on the company or DFFE website.
75. Protections on trade and industry secrets on the composition of chemical components used during the process make scientific inquiry, government regulation, monitoring and any possible rehabilitation of the health and environmental impacts of the process very difficult. Many other potential problems associated with the types of chemicals used in the industry are left unidentified and unmitigated.
76. The Regulation must set up a regime ensuring that appropriate waste treatment and environmental and health protection and environmental rehabilitation plans are in place should an applicant claim protection over proprietary chemical blends under relevant trade secret laws.

Need for chemical analysis of waste

77. The Regulations presently lack guidance on a system for testing fracking waste. Because fracking waste is more than the sum of the chemicals that enter the formation and those that come out of them – the chemicals injected and already present in the formation can undergo various transformations, producing new substances in the process – it is critical to test the waste to know what it needs to be treated for[45]. This testing must occur on an ongoing basis and must seek to identify a wide range of substances. It appears that some space may be made for such testing in the Regulations – "(iv) details of hydraulic fracturing and process water management programme, including testing programmes and operations which expands on the plans contemplated in regulation 7" (S 14.3.b.iv). Nevertheless, there is not presently a specific requirement for what that testing program and operations must contain, which is a significant gap.

4-7 Specific comment on waste management

78. The Regulations as proposed contain several strong provisions for managing waste from hydraulic fracturing. Nonetheless, additional detail and improvements on several points are necessary to reduce the risk of harm from these large volumes of toxic materials. No pit use allowed
79. The Regulations state:

"The following activities when undertaken in terms of an exploration or production right for onshore oil and gas intending to or utilising hydraulic fracturing are prohibited…(e) The storage of

[45] Kathrin Hoelzer et al., Indications of transformation products from hydraulic fracturing additives in shale-gas wastewater, 50 Environ. Sci. Technol. 8036–8048 (2016), https://doi.org/10.1021/acs.est.6b00430 (last visited Jun 12, 2020); Marika Nell & Damian E. Helbling, Exploring matrix effects and quantifying organic additives in hydraulic fracturing associated fluids using liquid chromatography electrospray ionization mass spectrometry, 21 Environ. Sci.: Processes Impacts 195–205 (2019), http://pubs.rsc.org/en/content/articlelanding/2019/em/c8em00135a (last visited Dec 3, 2020).

process water for reuse or disposal in pits or pollution control dams; (f) The storage of drill cuttings, sludge and waste other than in above ground tanks or leakproof skips…"

80. These are important requirements to maintain, as pits often leak or overflow, contaminating soils and waterways, and pose a danger to wildlife unlucky enough to land or fall into them[46]. It is critical, however, that the tanks and skips not leak or overflow themselves, as noted in II.8

No reinjection permitted

81. Also disallowed under the Regulations is the "Discharge or disposal of hydraulic fracturing fluids, process water or any other component of process water…(iii) to underground, including the use of re-injection disposal wells." (s. 4(c)(iii))
82. Reinjecting wastewater underground can seem a convenient way of dealing with large volumes of wastewater, but it poses additional risk of contamination to aquifers, and has been the primary source of induced seismicity, that is, small earthquakes caused by the pressure the injected water places on faults[47]. This induced seismicity not only damages local structures, but also increases risk and uncertainty for fracking operations and generates new pathways for groundwater contamination. As such, prohibition of wastewater reinjection as a method for disposal is also an important provision to maintain.

No disposal in government landfills

83. The Regulations further prohibit the "Discharge or disposal of hydraulic fracturing fluids, process water or any other component of process water…(iii) to a government water treatment works" (s. 4(c)(ii)).
84. As noted, fracking wastewater requires special treatment for its radioactivity, heavy metals, and high total dissolved solids, and government treatment works are typically unable to provide this treatment[48]. This is therefore an important provision to maintain. However, the Regulations would be strengthened by:
    - specifically naming the treatments required of wastewater to deal with these toxic materials, including the final disposal plan for the solids; and
    - requiring the identification within the EIA of the specific treatment facilities that are able to process this hazardous waste and elaborating a waste transportation plan to the facility named.

No disposal in watercourses – or anywhere without prior treatment

85. In addition, the Regulations prohibit discharge or disposal of wastewater "into a surface watercourse" (s. 4(c)(ii)). This should be a rather obvious, though necessary requirement. However, the prohibition should go further to prohibit discharge of all untreated process water anywhere on

[46] U.S. Fish and Wildlife Service, Wildlife Mortality Risk in Oil Field Waste Pits, (December 2000).
[47] Thomas H. W. Goebel & Emily E. Brodsky, The spatial footprint of injection wells in a global compilation of induced earthquake sequences, 361 Science 899–904 (2018), https://science.sciencemag.org/content/361/6405/899; Groundwater Protection Council, Produced Water Report: Regulations, Current Practices, and Research Needs 318 (2019).
[48] Nathaniel R. Warner et al., Impacts of shale gas wastewater disposal on water quality in Western Pennsylvania, 47 Environ. Sci. Technol. 11849–11857 (2013), https://doi.org/10.1021/es402165b.

the ground. Experience with dumping of process water on roads and fields in the US has shown that it contaminates not just the soil, but also local waterways when the dumped material runs off in rainstorms[49].

Need for tracking waste volumes

86. In addition to testing the waste, best practice dictates that the waste volumes be measured regularly and tracked through their transportation to their end disposal. This will help to ensure that nothing is lost along the way in the form of spills and will help the company and the government better understand and manage waste flows.

Need for clarity about conditions under which waste must be stored and transported

87. Currently, there is no specific freeboard requirement identified in the Regulations for the fracking waste held in tanks and skips, nor for the way this waste will be isolated from, for example, birds and other wildlife to prevent harm to them.
88. Moreover, there are no requirements for transportation of waste to a processing facility described. Given the often-poor condition of roads in rural regions where fracking is likely to take place, the waste will need to be carefully secured to prevent spills.

Additional provisions needed

89. The Regulations fail to set out any requirement or standard with respect to waste management. other than compliance with the waste management plan which is to be drafted and submitted by the applicant. There is no objective or transparent requirement when it comes to obtaining PASA's approval of the waste management plan.
90. The Regulations fail to address transportation, retainment, treatment, or disposal of the fracturing fluid and their relations with other relevant legislations, such as the *Hazardous Substances Act* 15 of 1973. The Regulations must iterate any other applicable legislation for better clarity and a more comprehensive legislative scheme.
91. Additionally, with respect to radioactive waste, section 22(7) of the Proposed Regulations merely require compliance with the *National Radioactive Waste Disposal Institute Act,* 2008, but they fail to provide additional considerations tailored specifically for hydraulic fracturing.
92. Section 4(c) of the Regulations prohibit certain Discharge or disposal of hydraulic fracturing fluids, but it does not impose any positive obligation on the applicant. It does not set out the facilities that can process the proposed fracturing fluids.

4-8 Specific comment on noise, light and air pollution

93. The Regulations do not prescribe minimum or strict standards or oversight over mitigation for noise, light, or air pollution during operations. Concerns regarding noise, light and air pollution were addressed in the MIR, introduced on 08 July 2022. The Regulations need to be amended to realign and reconcile these concerns in the MIR and to outline standards and oversight on mitigation of noise, light and air pollution.

[49] Nancy E. Lauer, Nathaniel R. Warner & Avner Vengosh, Sources of Radium Accumulation in Stream Sediments near Disposal Sites in Pennsylvania: Implications for Disposal of Conventional Oil and Gas Wastewater, 52 Environ. Sci. Technol. 955–962 (2018), https://doi.org/10.1021/acs.est.7b04952 (last visited Mar 6, 2020).

94. The only relevant provision, section 22(1), merely requires that any water or air quality analysis must be undertaken by a third party using international or SANAS accredited facilities and according to national and international analytical methods.
95. Section 22(1) appears to be a mere supplement to the MIR, with respect to conducting a base line monitoring of the noise, light and air quality of the area.

Limitations on subsidiary legislation

96. *Minimum Information Requirement for the Submission of Applications for an Authorisation, Permit or Licence for the Exploration and Production of Oil and Gas Utilising Hydraulic Fracturing* - requirements have not yet been released for comment at the time of review of the Regulations. It is impossible to evaluate these regulations without the minimum information requirements. These be released and reconciled before these regulations are finalized.

97. The Regulations do not state strict measures on applicants to indicate how biodiversity counterbalance is offset, and how the Biodiversity Action Plan will be implemented to restore degraded aquatic biodiversity.

PART 5: CONCLUSIONS AND RECOMMENDATIONS

98. Natural Justice urges a complete ban on all hydraulic fracturing operations based on the precautionary principle and scientific evidence demonstrating the health risks, environmental pollution, GHG emission, and induced seismic activities.
99. Renewable energy options, such as wind and solar power, create more jobs than gas while lowering electricity costs and emissions. In comparison to gas-to-power, solar PV and off- and onshore wind together generate over ten times as many employments annually per MW during building, installation, and manufacture, as well as eleven times as many jobs annually per MW during operation and maintenance.[50] Unsubsidized renewable energy such as wind or solar has already been successfully developed in South Africa and is significantly less expensive than any gas-to power options. It also offers advantages such as increased job creation per unit of energy, decreased environmental impact, decreased GHG emissions, and immunity from volatile fuel prices. Renewable energy is a good starting point for a just transition. Therefore, there is no need for gas as a bridging fuel.
100. The proposed Regulations also fail to present a comprehensive legislative scheme to properly facilitate hydraulic fracturing operations.

101. Alternatively, if fracking is to be allowed the Regulations need to provide for a phased and measured approval system, to allow for a cautious introduction of fracking in South Africa. A practical data collection and assessment initiative of socio- economic, technological and

[50] Teske, S., Dominish, E., Briggs, C., Mey, F., & Rutovitz, J. (2019). Outlook on employment effects of a global energy transition. Greenpeace. https://www.greenpeace.org/static/planet4- africa-stateless/2019/04/6cd35f47-jt global-employment-report.pdf

environmental on a ‘test case’ basis should be done before accelerated and wholesale licensing, approvals or authorisations' are granted.