GOVERNMENT NOTICES • GOEWERMENTSKENNISGEWINGS

DEPARTMENT OF WATER AND SANITATION

NO. 5582 **22 November 2024**

NATIONAL WATER ACT, 1998

REGULATIONS FOR THE USE OF WATER FOR EXPLORATION AND PRODUCTION OF ONSHORE NATURALLY OCCURRING HYDROCARBONS THAT REQUIRE STIMULATION, INCLUDING HYDRAULIC FRACTURING AND UNDERGROUND COAL GASIFICATION, TO EXTRACT, AND ANY ACTIVITY INCIDENTAL THERETO THAT MAY IMPACT DETRIMENTALLY ON THE WATER RESOURCE

I, Pamela Castelina Majodina, Minister of Water and Sanitation, in terms of section 26(1)(g) of the National Water Act, 1998 (Act No. 36 of 1998), read together with Government Notice 999 (Government Gazette No: 39299), of 16 October 2015, and published *Regulations for the use of water for exploration and production of onshore naturally occurring hydrocarbons that require stimulation, including hydraulic fracturing and underground coal gasification, to extract, and any incidental thereto that may impact detrimentally on the water resource* (Government Gazette No: 44545 dated 07 May 2021); hereby make the Regulations in the Schedule hereto.

Any person wishing to comment on or make representations with regards to the proposed Regulations is hereby invited to do so within 30 days (excluding from15th December 2024 to 05 January 2025) of the date of publication of this notice. All such comments and representations must be submitted in writing in any of the following ways:

By post to: The Director-General
Department of Water and Sanitation
Private Bag X313
Pretoria
0001

By hand to: The Director-General
Department of Water and Sanitation
Sedibeng Building, 185 Francis Baard Street,
Pretoria

By e-mail to: unconventionalgas@dws.gov.za

Comments or representations must be marked for the attention of: Deputy Director-General: Regulation, Compliance and Enforcement, Mr. Collin Xolani Zwane.

By hand to: The Director-General
Department of Water and Sanitation
Sedibeng Building, 185 Francis Baard Street,
Pretoria

By e-mail to: unconventionalgas@dws.gov.za

Comments or representations must be marked for the attention of: Deputy Director-General: Regulation, Compliance and Enforcement, Mr. Collin Xolani Zwane.

Any enquiries in connection with the proposed Regulations can be directed to Ms. R.N Mazwi at 012 336 7554 or to mazwir@dws.gov.za.

Comments received after the closing date may not be considered.

The Department of Water and Sanitation complies with the Protection of Personal Information Act, 2013 (Act No. 4 of 2013). Comments received and responses thereto are collated into a comments and response report which will be made available to the public as part of the consultation process. If a commenting party has any objection to his or her name, or the name of the represented company/ organisation, being made publicly available in the comments and responses report, such objection should be highlighted in bold as part of the comments submitted in response to this Government Notice.

MISS P C MAJODINA, MP
MINISTER OF WATER AND SANITATION
DATE: 26/10/2024

SCHEDULE

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CHAPTER 1

GENERAL PROVISIONS

Definitions

1. In these Regulations, a word or expression to which a meaning has been assigned in the Act, bears the meaning so assigned and, unless the context otherwise indicates—

"Abandonment of wells" means the sealing off an unused exploration or production well by inserting plugs to isolate zones with potential for flow of subsurface fluids including hydrocarbons to the surface and undertaking of tests to ensure the integrity of the inserted plugs and well cement;

"API standard" means the relevant American Petroleum Institute Standards;

"Baseline monitoring" means the monitoring of key indicators to establish reference conditions of the potentially affected environment prior to fracturing to form the basis for determining a change over time;

"Blowout" means an uncontrolled release of hydrocarbons from a well after pressure control systems have failed.

"Coalbed methane" means natural gas extracted from coal beds;

"Controlled" activity" means the controlled activity declared by the Minister by notice in the Government Gazette No. 39299, Notice 999 of 2015 in terms of section 38 of the Act in respect of the exploration and production of onshore naturally occurring hydrocarbons that requires stimulation, including hydraulic fracturing and underground gasification, to extract, and any activity incidental thereto that may impact detrimentally on the water resource;

"Days" means calendar days

"Decommissioning" means the planned shutdown of an exploration or production well with the plugging of wells, removal of well equipment, production tanks and

associated installations, site rehabilitation and monitoring and where relevant the final decommissioning and closure of the exploration or production operation;

"Designated agency" means the agency designated in terms of section 70 of the Mineral and Petroleum Resources Act, 2002 namely the Petroleum Agency South Africa;

"Exploration" means the acquisition and processing of data or any other activity with the intention of locating an economically viable regulated substance including the appraisal phase of a controlled activity, developing conceptual geological and geo-hydrological models and drilling of exploration wells;

"Flow back" means hydraulic fracturing additives and other fluids that return to the surface after fracturing has been completed;

"Government Notice 704" means Regulations On Use Of Water For Mining And Related Activities Aimed At The Protection Of Water Resources. *Published under Government Notice 704 in Government Gazette 20119. Commencement date: 4 June 1999.*

"Hydraulic fracturing" means an intervention performed on a well to increase production by improving the flow of petroleum from the drainage area into the well bore and includes re-fracturing.

"Hydraulic fracturing additive" means a chemical or mixture of chemicals that are added to the base fluid to change its properties;

"Hydraulic fracturing fluids" means the mixture of the base fluid and the fracturing additives used to stimulate the free flow of a petroleum reserve;

"Hydraulic fracturing programme" means a programme developed and based on risk assessment and describes control and mitigation measures for fracture containment and for any potential induced seismicity;

"Hydrocensus" means the systematic collection of information related to all water resource features potentially affected within a target area;

"Independent" in relation to a competent person means—

(a) that such person or an environmental control officer has no business, financial, personal or other interest in the activity or application in respect of which that person or environmental control officer is appointed in terms of these Regulations; or

(b) that there are no circumstances that may compromise the objectivity of that person or environmental control officer in performing such work;

excluding—

(i) normal remuneration for such person or environmental control officer; or

(ii) fair remuneration for work performed in connection with that activity, application or environmental audit;

"Karoo Central Astronomy Advantage Area" means the area declared in terms of the Astronomy Geographic Advantage Act, 2007 (Act No. 21 of 2007) published under Government Notice No. 198 in Government *Gazette* No. 37434 of 12 March 2014;

"Minimum information requirement for baseline monitoring for onshore exploration operations" means the minimum information requirements for the baseline monitoring that is to be undertaken prior to fracturing operations being undertaken in an onshore exploration operation;

"Minimum information requirement for the exploration and production of onshore petroleum using fracturing" means the minimum information requirements for the impact assessment requirements for onshore exploration and production using fracturing

"Mining operation" has the meaning assigned to it in the Mineral and Petroleum Resources Development Act (2002);

"Monitoring" in relation to water resource quality means repeated sampling of water resource quality and quantity for the purposes of building time series data on water resources that would indicate seasonal quality and quantity fluctuations;

"Monitoring borehole" means a borehole used to measure groundwater trends and quality;

"Municipal wellfield" means a water resource used by water services institutions to provide water supply services and includes future potential identified water resources;

"Month" means calendar month

"National web based environmental screening tool" means the online spatial application contemplated in the Environmental Impact Assessment Regulations available at https://screening.environment.gov.za/screeningtool;

"Naturally occurring hydrocarbons" means an organic compound containing only carbon and hydrogen naturally occurring in petroleum, natural gas, coal and bitumen;

"Onshore" means situated or occurring onland;

"Petroleum" has the meaning assigned to it in the Mineral and Petroleum Resources Development Act (2002);

"Process water" means all water used for exploration, mining and/or production operations;

"Produced water" means all fluids displaced from the geological formations, which can contain substances that are found naturally in the formations that are produced when performing a controlled activity, but excludes hydraulic fracturing flowback;

"Production" means any operation, activity or matter that relates to the exploration, appraisal, development and production of regulated substances;

"Prospecting" has the meaning assigned to it in the Mineral and Petroleum Resources Development Act (2002);

"Radioactive material" means any substance consisting of, or containing, any radioactive nuclide, whether natural or artificial, including, but not limited to, radioactive waste;

"Responsible authority" has the meaning assigned to it in the Act;

"Spring" means a point where subsurface water emerges at surface, usually as a result of topographical, lithological or structural controls;

"Stimulation" means the act of increasing a well's productivity by artificial means such as hydraulic fracturing, refracturing, gasification, depressurization or pressurization, acidizing, oxidizing other techniques;

"Strategic water source area" is defined as areas of land that either: (a) supply a disproportionate (i.e. relatively large) quantity of mean annual surface water runoff in relation to their size and so are considered nationally important; or (b) have high groundwater recharge and where the groundwater forms a nationally important resource; or (c) areas that meet both criteria (a) and (b);

"Temporarily Suspended Well" means a well where either drilling or production activities have temporarily ceased, and temporary plugs have been inserted into the well;

"the Act" means the National Water, 1998 (Act No. 36 of1998);

"Underground coal gasification" means conversion of coal to gas mixtures by chemical reaction of a coal seam, involving the drilling of a single or more wells system into the coal seam where injection of fluids occurs and extraction of product gases to the surface via the well system with interconnecting paths;

"Wastewater" means water containing waste, or water that has been in contact with waste material;

"Water supply services" means the sustainable abstraction form a water resource, conveyance, treatment, storage and distribution of potable water, water intended to be converted to potable water or water for commercial use, but not water for industrial use or other use, to consumers or other water services providers;

"Water use license" means a license issued in terms of section 40 of the Act;

"Well" means a drilled hole used for the purpose of exploration, mining or production of a ~~regulated~~ gas substances;

"Zone of influence" is an area in which an activity could directly or indirectly impact part of the environment;

Purpose of Regulations

2. The purpose of these Regulations is to protect a water resource so as to avoid and minimise detrimental and cumulative impacts on the water resource by the controlled activity.

Application of Regulations

3. (1) These Regulations apply throughout the Republic of South Africa to all onshore exploration, mining, and production operations for controlled activities (as per these regulations) that may impact detrimentally on a water resource.

(2) These Regulations do not exempt a person from complying with any other provision of the Act, or any other applicable law, regulation, and/or ordinance or by-law of another organ of state.

(3) These regulations must be read together with:

(i) the Regulations Pertaining to Exploration and Production of Onshore Petroleum Resources Requiring Fracturing,

(ii) the Minimum Information Requirements for baseline monitoring for onshore exploration operations and

(iii) the Minimum Information Requirements for the exploration and production of onshore petroleum using fracturing technology.

(4) A person may not conduct, carry out, undertake or commence with a controlled activity without a water use license.

CHAPTER 2

APPLICATIONS AND LICENSING

Baseline Monitoring Plan

4. (1) The applicant intending to undertake exploration of hydraulic fracturing and coalbed methane and other techniques with similar operation activities must determine the pre-fracturing baseline conditions through the preparation of a baseline monitoring plan.

(2) The plan referred to in sub-Regulation 4 (1) must be compiled as contemplated in the Minimum Information Requirements for baseline monitoring for onshore exploration operations which must be submitted with the consolidated assessment report of the process as part of the application for a water use license.

(3) The plan referred to in sub-Regulation 4 (1) will be assessed and approved by the designated agency in concurrence with the Minister of Water Affairs.

(4) The applicant intending to undertake Underground Coal Gasification (UCG) in terms of Minerals and Petroleum Resources Development Act (MPRDA) (2002), must determine the pre-conditions through preparation of baseline water monitoring plan.

(5) The plan referred to in sub-regulation 4 (4) will be assessed and approved by Department and must be compiled according to the Minimum Information Requirements for such activities as contemplated in the Regulations regarding procedural requirements for water use application in Annexure F and any other subsequent amendments.

(6) The plan referred to in sub-regulation 4 (4) must include Water Quantity and Water quality Monitoring for a minimum of two years, prior to application for a water use license for underground coal gasification.

(7) Any water quality analysis on the data contemplated for the plan referred to in sub-regulation 4 (4), must be conducted using laboratories that are accredited for using international organization standardization (ISO/IEC 17025:2017) standards or any equivalent standards.

Conducting of a controlled activity for exploration (using hydraulic fracturing and coalbed methane extraction and other techniques with similar operation) and prospecting for underground coal gasification

5. (1) An application for a water use license for exploration of hydraulic fracturing and coalbed methane extraction must include the Baseline Monitoring Plan as specified in 4(1) and must meet the Minimum Information Requirement specified by the Minimum Information Requirement for the exploration and production of onshore petroleum using fracturing with the intention to utilize hydraulic fracturing.

(2) An application for a water use license for prospecting with an intention to engage in UCG must meet the minimum Information requirements specified in 4(4) and must meet the Minimum Information Requirements for UCG and include the Baseline water monitoring plan.

(3) A water use license during exploration operation is valid for the period specified in the water use license which may not exceed a period of two years and may be renewed for three periods each of which may not exceed one year.

(4) Throughout the exploration and prospecting, the holder must provide to the responsible authority, operational environmental monitoring reports, which comply with the monitoring requirements approved in the operational monitoring plan submitted as part of the Environmental Impact Assessment.

(5) (a) The holder of a water use license for exploration and prospecting may produce a regulated substance from a well in the licensed area for the purpose of establishing the nature and extent of a discovery.

(b) The production of a regulated substance contemplated in paragraph 5 (a) may not continue more than the authorized period.

Applications for water use license for production of controlled activities

6. (1) An application for a water use license during production may not extend beyond the licensed area.

(2) An application for a water use license for production of hydraulic fracturing and coalbed methane extraction must include the Baseline Monitoring Plan as specified in 4(1) and must meet the Minimum Information Requirement specified by the Minimum Information Requirement for the exploration and production of onshore petroleum using fracturing with the intention to utilize hydraulic fracturing.

(3) An application for a water use license for production with an intention to engage in UCG must include a baseline water monitoring plan specified in 4(4) and must meet the Minimum Information Requirements for UCG included in the Regulations regarding procedural requirements for water use application in Annexure F and any other subsequent amendments.

(4) If the applicant for a water use license during production has not complied with the conditions of his or her water use license during exploration/prospecting, the responsible authority may decline to grant a water use license during production until such time as the non-compliance is remedied to the satisfaction of the responsible authority.

(5) Notwithstanding Regulation 6 (2), the water use application for production may be declined by the responsible authority based on the non-compliance by the applicant in respect of other licensed areas.

(6) A water use license during production lapses if the holder thereof fails to commence production in terms of the water use license within five years after the issuance of the water use license.

(7) Throughout the production operation, the holder of the exploration right must provide to the Responsible authority and the designated agency, operational environmental monitoring reports, which comply with the monitoring requirements contemplated in the minimum information requirements for the exploration and production of onshore petroleum using fracturing, and the approved baseline monitoring plan.

(8) Throughout the production operation, the holder of the mining right must provide to the Responsible authority operational environmental monitoring reports, which comply with the monitoring requirements contemplated in the Minimum information requirements for Regulations regarding procedural requirements for water use application in Annexure F and any other subsequent amendments and the approved baseline water monitoring plan.

Suspension and withdrawal of water use license

7. (1) If the responsible authority has reason to believe that the water use license was obtained through fraud, repetitive non-compliance, non-disclosure of material information or misrepresentation of a material fact, the responsible authority may, in writing—

(a) suspend or partially suspend, with immediate effect, the water use License; and

(b) direct the holder of such a water use License forthwith to cease any activities that have been commenced or to refrain from commencing any activities, pending a decision to withdraw the water use License.

(2) The License holder must be given an opportunity to make representations within a reasonable period, on the suspension or withdrawal of the water use License.

(3) The responsible authority may upon good reason being shown, withdraw the suspension.

(4) When withdrawing a water use License, the responsible authority may direct the necessary rehabilitation measures required.

CHAPTER 3

PROHIBITIONS AND RESTRICTIONS

Prohibited areas

8. (1) The exploration and production of controlled activities, including directional drilling are prohibited within–

(a) five kilometres of any government waterworks and dams with a safety risk;

(b) five kilometres from a strategic water source area as identified on the national web based environmental screening tool https://screening.environment.gov.za/screeningtool

(c) five kilometres from towns and highly populated areas; and

(d) five kilometres from a thermal or cold spring.

(e) heritage sites and sites containing heritage resources, objects or structures defined in terms of the National Heritage Resources Act, 1999 (Act No. 25 of 1999);

(f) areas identified in terms of section 48(1)(a) and (c) of the National Environmental Management: Protected Areas Act, 2003 (Act No. 57 of 2003);

(g) the Sutherland Central Astronomy Advantage Area identified in figure 1 of Government Notice No. 199 published in Government Gazette No. 37434 on 12 March 2014;

(h) the Karoo Central Astronomy Advantage Area 3 described in paragraph 3(4) of the schedule and identified in figure 1 of Government Notice No. 198 published in Government Gazette No. 37434 on 12 March 2014;

(i) ten kilometres of the protection corridors containing the SKA radio astronomy stations identified in Annexure A to Schedule A of Government Notice No. 1411 published in Government Gazette No, 41321 on 15 December 2017;

Prohibited activities

9. The following activities are prohibited in the exercising of an exploration or production right for a controlled activity:

(a) in areas where the rainfall is under 400mm per annum, the abstraction of water, except for deep saline aquifers, for any purpose in the exploration or production operation other than for drinking, domestic use or the preparation of the slurry for cement mixtures on which tests will be conducted;

(b) the disposal of process water from the exploration or production operation without at least one reuse;

(c) the discharge or disposal of fracturing fluids, process water or any other component of process water–

(i) into a surface watercourse without treatment to limits which comply to the water quality discharge limits In Annexure C;

(ii) onto land through irrigation without treatment to limits which comply to the water quality irrigation limits in Annexure C;

(ii) to a government wastewater treatment works; or

(iii) underground, including through the use of re-injection wells;

(d) the disposal of sludge to landfill with a water content of >40% or that liberates moisture under pressure in landfill conditions and which has not been stabilized by treatment;

(e) the storage of process water for reuse or disposal in pits, retention dams or pollution control dams;

(f) the storage of drill cuttings, sludge and waste other than in above ground tanks or leakproof skips;

(g) the use of groundwater monitoring boreholes for abstraction purposes; and

(h) the use of substances identified in Annexure A as additives to fracturing fluids.

Restricted areas

10. (1) Where not already prohibited in terms of regulation 8, the following geographical areas are restricted for the purposes of exploration and production of a petroleum resource using fracturing, or prospecting and production with an intention to engage in UCG, but may be considered based on a motivation and supporting evidence that demonstrate that these activities and operations can be undertaken within the set distances and in which case approval to relax the buffer must be obtained from the relevant authority:

(a) within five kilometres from the edge of an existing or proposed municipal wellfield, including its aquifer, water supply boreholes and groundwater supply infrastructure;

(b) in the area located outside of the Karoo Central Astronomy Advantage Area 3, but within the boundaries of the Karoo Central Astronomy Advantage Area 1 described in paragraph 3(2) and 3(4) of the schedules and identified in figure 1 of Government Notice No. 198 published in Government *Gazette* No. 37434 on 12 March 2014;

(2) the motivation and supporting scientific evidence that demonstrates the need for relaxation of the buffer contemplated in 10(1) must be set out as per:

(a) the Minimum information requirements Regulations regarding procedural requirements for water use application in Annexure F and any other subsequent amendments

(b) Minimum Information Requirement for the exploration and production of onshore petroleum using fracturing with the intention to utilize hydraulic fracturing.

CHAPTER 4

DRILLING, WELL DESIGNS AND DECOMMISSIONING

11. (1) Well designs for drilling and testing of all exploration and production must adhere to the stipulated and respective American Petroleum Institutes (API) Standards and/or relevant standards as per Annexure B

(2) the well designs contemplated in sub-regulation 11 (1), will be assessed as part of the water use license application and approval of exploration and production rights by the designated agency.

(3) Well designs and underground coal gasifier for underground coal gasification must be designed by a professional civil engineer registered under the Engineering Profession of South Africa Act, 1990 (Act 114 of 1990), and must adhere to the best practice.

(4) the well designs and underground coal gasifier, will be assessed as part of the water use license application and approved by the responsible authority.

(5) All wells for exploration, mining and/or production including the temporarily suspended wells, must be decommissioned within 180 days after final use.

(6) A holder must ensure that wells are decommissioned as contemplated in the "Onshore Well Decommissioning Guidelines" issued by the Petroleum Agency South Africa, document number: Agency- TC – 001

(7) The holder must prepare a final rehabilitation, decommissioning and closure plan for incorporation into the initial and ongoing reviews of the final rehabilitation, decommissioning and closure plan contemplated in the Financial Provisioning Regulations.

(8) A holder must monitor decommissioned wells in compliance with the final rehabilitation, decommissioning and closure plan contemplated in sub-regulation (7).

(9) A holder must submit the results of the monitoring to the designated agency and the Minister responsible for Water Affairs on the first working day of each quarter, unless there are identified anomalies, spikes or exceedances of requirements, in which case such anomalies, spikes, or exceedances must be reported within 12 hours of identification.

(10) The applicant must provide funding for the decommissioning, rehabilitation and closure of the exploration, mining and production operations as prescribed in the NEMA: Financial Provisioning Regulations.

CHAPTER 5

HYDRAULIC FRACTURING ADDITIVES AND WASTEWATER MANAGEMENT

12. Hydraulic fracturing additives and wastewater management

(1) A person may not use restricted chemicals or substances as listed on Annexure A of these Regulations in drilling as hydraulic fracturing additives.

(2) A person who applies for a water use license must—

(a) submit to the responsible authority for approval, a list of all chemicals planned for use as hydraulic fracturing additives; and

(3) The applicant must develop and submit an integrated water and wastewater management plan as per the Minimum Information Requirements for baseline monitoring for onshore exploration operations and the Minimum Information Requirements for the exploration and production of onshore petroleum using fracturing by Department of the Environment, which will include the management of:

(a) blowout;
(b) produced water;
(c) flowback;
(d) reuse;
(e) storage; and
(f) information relating to the waste management facility for disposal of waste (e.g. drill cuttings with no radioactive material) and wastewater treatment as part of the water use license application.

(4) The disposal of drill cuttings containing radioactive material must be managed according to the National Radioactive Waste Disposal Institute Act (2008).

CHAPTER 6

GENERAL

General

13. Every applicant and holder have an obligation to—

(a) identify, assess, avoid and if avoidance is not possible, to mitigate, manage and monitor all potential environmental impacts that may arise from

exercising an exploration or production right for onshore petroleum requiring the use of fracturing;

(b) through all phases of the operations, monitor and assess any changes to the baseline environmental attributes and determine and report on the associated risk through ongoing monitoring and reporting;

(c) ensure that all materials used, and procedures adhere to international best practices and standards;

(d) decommission all exploration and production wells, remove any structures and rehabilitate the area used for exploration and production operations, as well as any area affected by the operations, monitor the continued integrity of the decommissioning and rehabilitation and report on the findings through auditing procedures;

(e) provide funding for the decommissioning, rehabilitation and closure of the exploration and production operations as prescribed in the Financial Provisioning Regulations;

(f) be in possession of all relevant rights, permits, authorizations, approvals, consents and licenses prior to the exercising of an exploration or production right; and

(g) meet the design, construction and testing standards identified in Annexure B.

(h) Register all wells on the licensed area with the National Ground Archive or any other information system prescribed by the Department.

(i) Unplanned escape of gas will be considered an incident and must be reported to the responsible authority.

(j) An authorised person may, at any reasonable time and without prior notice, enter or cross a property with the necessary persons, vehicles, equipment and material to carry out routine inspections of the use of water under any authorisation.

(k) Underground coal gasification operations must adhere to Government Notice 704 as it forms part of mining activities

CHAPTER 7

DISCLOSURE

Disclosure

14. The holder of a water use license must—

(1) ensure that the water use license is made available to anyone on request, for access and copying, at the site of the controlled activity; and

(2) publish the following information within one month of the issuance of the water use license and update it annually on its website:

(a) A complete copy of the water use license;

(b) the relevant hydrocensus, approved baseline monitoring plan and monitoring information, risk analysis information and environmental impact assessment;

(c) the hydraulic fracturing programme;

(d) the hydraulic fracturing additives, their quantities, including proppant, base carrier fluid as approved by the responsible authority together with the designated agency and

(e) the Material Safety Data Sheets (MSDS's);

(f) the trade name of each additive and its general purpose in the fracturing process;

(g) each chemical intentionally added to the base fluid, including the chemical makeup, and if applicable the actual concentration to be used in percentage or by mass; and

(h) the location of all wells and monitoring boreholes and well integrity information, verified by an independent competent person or an environmental control officer; and

(i) audit reports as specified in the water use license.

(3) The website must be accessible by the public.

CHAPTER 8

OFFENCES

Offences

15. (1)A person is guilty of an offence if that person—

(a) provides incorrect or misleading information in any form, including any document submitted in terms of these Regulations, to a responsible authority and the public, or intentionally omits information that may have an influence on the outcome of a decision of a responsible authority;

(b) obtains a water use License through fraud, non-disclosure of material information or misrepresentation of a material fact, or

(c) fails to comply with any provision of these Regulations or the Act.

(2) A person who commits an offence in terms of sub-regulation 15(1) is liable, on the first conviction, to a fine or imprisonment for a period not exceeding five years, or to both a fine and such imprisonment and, in the case of a second or subsequent conviction, to a fine or imprisonment for a period not exceeding ten years or to both a fine and such imprisonment.

CHAPTER 9

TRANSITIONAL ARRANGEMENTS

Transitional arrangements

16. (1) Once the Upstream Petroleum Resources Development Bill is passed and brought into operation, any reference to the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) must be construed as a reference to the Upstream Petroleum Resources Development Bill.

(2) Once the Upstream Petroleum Resources Development Bill is passed and brought into operation, and until such time that amendments are made to the National Environmental Management Act, 1998 (Act No. 107 of 1998), the Environmental Impact Assessment Regulations, 2014 and associated Listing Notices, and these Regulations, a reference in these Regulations to–

(a) an exploration right must be construed as a reference to the exploration phase of the petroleum right contemplated in the Upstream Petroleum Resources Development Bill, including all terms and renewals of the exploration phase, of the petroleum right;

(b) a production right must be construed as a reference to the production phase of the petroleum right contemplated in the Upstream Petroleum

Resources Development Bill, including all terms and renewals of the production phase, of the petroleum right.

CHAPTER 10

SHORT TITLE

Short title and commencement

17. These Regulations are called Regulations for the Use of Water for Exploration and Production of Onshore Naturally Occurring Hydrocarbons that Require Stimulation Including Hydraulic Fracturing and Underground Coal Gasification to Extract and any Activity Incidental thereto that may Impact Detrimentally on the Water Resource, 2024, also referred to as the Unconventional Gas Regulations and take effect on the date to be determined by the Minister by notice in the Government *Gazette*.

ANNEXURE A

PROHIBITED SUBSTANCES

The following substances will not be allowed as additives to fracturing fluids

Chemical Components	Classification	CAS Registry
Methanol (Methyl)	HAP[1]	67-56-1
Ethylene glycol (1,2 – Ethanediol)	HAP	107-21-1
Diesel	Carcinogen, SDWA[2], HAP	68476-34-6
Naphthalene	Carcinogen, HAP	91-20-3
Xylene	SDWA, HAP	1330-20-7
Hydrogen chloride	HAP	7647-01-0
Toluene	SDWA, HAP	108-88-3
Ethylbenzene	SDWA, HAP	100-41-4
Diethanolamine (2,2 iminodiethanol)	HAP	111-42-2
Formaldehyde	Carcinogen, HAP	50-00-0
Sulphuric acid	Carcinogen	7664-93-9
Thiourea	Carcinogen	62-56-6
Benzyl chloride	Carcinogen, HAP	100-44-7
Cumene	HAP	98-82-8
Nitrilotriacetric acid	Carcinogen	139-13-9
Dimethyl formamide	HAP	68-12-2
Phenol	HAP	108-95-2
Benzene	Carcinogen, SDWA & HAP	71-43-2
Di (2-Ethylhexyl) Phthalate	Carcinogen, SDWA & HAP	117-81-7
Acrylamide	Carcinogen, SDWA & HAP	79-06-1
Hydrogen fluoride (Hydrofluoric Acid)	HAP	7664-39-3
Phthalic anhydride	HAP	85-44-9
Acetaldehyde	Carcinogen, HAP	75-07-0

[1] Hazardous Air Pollutant
[2] Safe Drinking Water Act – is the principle federal law in the United States intended to ensure safe drinking water for the public

Acetophenone	HAP	98-86-2
Copper	SDWA	7440-50-8
Ethylene oxide	Carcinogen, HAP	75-21-8
Lead	Carcinogen, SDWA & HAP	7439-92-1
Propylene oxide	Carcinogen, HAP	75-56-9
p-Xylene	HAP	106-42-3
1-Methylnaphthalene		90-12-0
2-Butanone (MEK)		78-93-3
Aniline	Carcinogen* ^HAP	62-53-3
2-Methylphenol	^HAP	95-48-7
3- Methylphenol	^HAP	108-39-4
Acetonitrile	^HAP	75-05-8
Phenol	$Mutagenic Cat 2, ^HAP	108-95-2
Thiophene		110-02-1
Pyrrole		109-97-7
2-Methylnaphthalene		91-57-6
Benzidine	Carcinogen*, ^HAP	92-85-5
Isophorone	Carcinogen (Category 2), ^HAP	78-59-1
Chloroethane	Carcinogen, ^HAP	75-00-3
2-pyrrolidone		616-45-5
Vinyl chloride	Carcinogen*,SDWA,^HAP	75-01-4
Bromomethane	**Mutagenic Cat 2,^HAP	74-83-9
4-methylphenol	^HAP	106-44-5
Acetone		67-64-1
2-Hexanone	Reproductive Toxicity Cat 2,	591-78-6

*As per the International Agency for Research on Cancer (IARC)

**GHS only on germ cell mutagenicity (somatics are not) is classified.

^ Initial List of Hazardous Air Pollutants with Modifications | US EPA

ANNEXURE B

WELL CONSTRUCTION STANDARDS

1. General

(1) A holder must ensure that a well design is informed by a risk assessment, and is constructed, equipped, commissioned, operated, modified, maintained, suspended and decommissioned in a manner that provides for the control of the well at all times.

(2) The holder must plan for multi-well pads and horizontal drilling technologies in order to optimise the spacing between neighbouring wells and minimize cumulative surface impacts of the operation.

(3) Where an API standard is prescribed, the most current standard is to be used.

2. Objective of well design

The overall objective of a well design is to–

(a) isolate aquifer and permeable zones by employing environmentally protective well casings;
(b) protect groundwater and prevent the migration of polluted water into groundwater, the exploration or production well and the disturbing of deep saline aquifers; and
(c) protect against casing deformation and cement degradation.

3. Well construction

(1) A well must be cased according to current industry standards published by the API"5CT Specification for Casing and Tubing" and the casing thread compound and the use must conform to the API RP 5A3.

(2) A casing installed must have a minimum yield pressure designed to withstand at least 1.2 times the maximum pressure to which the casing may be subjected during drilling, production and fracturing operations.

(3) Casings may not be–

(a) pitted, patched, bent, corroded, crimped;
(b) the threads may not be worn or damaged; and
(c) reconditioned.

(4) Casings must pass the approved hydrostatic pressure and drift test pursuant to API "5CT Specification for Testing and Tubing.

(5) Conductor casing must be set and cemented to a surface to-

(a) isolate shallow aquifers;
(b) stabilize unconsolidated sediments; and
(c) provide a base for equipment to divert shallow natural gas.

(6) Surface casings for exploration or production wells must be-

(a) set to a depth of 60m below the base of the deepest water which is fit for use or at least 100m above the top of the expected petroleum bearing zone, whichever comes first;
(b) installed and be fully cemented to the surface where intermediate casings are not installed;
(c) centralised at the shoe, above and below a stage collar or diverting tool, and through water zones that are fit for use;
(d) centralised in each segment of the wellbore to provide sufficient casing standoff and to foster effective circulation of cement to isolate aquifers, flow-zones, voids, lost circulation zones and hydrocarbon production zones; and
(e) cemented to a surface.

(7) Intermediate casings for exploration and production wells used to isolate water fit for use -

(a) must be set at least 30 meters below the base of the deepest fresh water found and must be cemented to the surface to protect unexpected fresh water found below the surface casing shoe;

(b) where intermediate casing is set solely to protect fresh water encountered below the surface casing shoe and where cementing to the surface is technically infeasible and may result in lost circulation or both, cement must be brought to a minimum of 180 meters above the shallowest freshwater zone encountered below the surface casing shoe;

(c) may not be used as a production string in the well in which it is installed and must not be perforated for purposes of conducting fracturing treatment through it.

(8) A production casing must be set and be fully cemented to 150 meters above the top of the perforated zone.

(9) The location and depths of petroleum bearing zones or water zones that are fit for use that are open to the wellbore above the casing shoe, must be confirmed by coring, electric logs, testing or such data from an offset well on the same well pad.

(10) Casings must be centralised in each segment of the wellbore to provide sufficient casing standoff and foster effective circulation of cement to isolate critical zones including aquifers, flow-zones, voids, lost circulation zones and hydrocarbon production zones.

(11) In non-deviated holes, a pipe centraliser must be placed every fourth joint from the collar cement shoe to the ground surface or to the bottom of the collar.

(12) The designated agency may require additional centralisation where necessary in order to ensure the adequacy of the integrity of the well design.

4. Cement requirements and compression testing

(1) Fracturing operations must be isolated from water which is fit for use and other permeable zones by ensuring complete cement isolation in each casing annulus.

(2) Cementation of casings must be done by the pump and plug method with a minimum of 25% excess cement and the using of appropriate loss circulation material.

(3) Cement placed in the well bore must meet the standards of API "10 A Specification for cements and materials for well cementing' or ASTM "C150/C150M Standard Specification for Portland Cement".

(4) Foamed cement slurry must be prepared to minimise its free water content in accordance with API "RP 10B-4 Recommended Practice on Preparation and Testing of Foamed Cement Slurries at Atmospheric Pressure".

(5) Water used for preparing the slurry for the cement mixtures on which tests will be conducted as contemplated in subparagraph (4) must be distilled water or tap water.

(6) Tests contemplated in subparagraph (5) must be conducted using the equipment and procedures established in the current API "RP 10 B-2 Recommended Practise for Testing Well Cements".

(7) The cement used for well construction must have a compressive strength of at least 8273.71kPa (1.200 psi) and the free water separation must be no more than 6 millilitres per 250 millilitres of cement, tested in accordance with the API TR 10TR3.

(8) Cement compressive strength tests must be performed on all cement that will be used in casing strings before its use to ensure that it meets the required strength as contemplated in paragraph (10) and where it does not comply with the standards, the tests must be redone.

(9) After the cement is placed behind the casing, time must be allowed for the cement to set until the cement achieves a calculated compressive strength of at least 3447.38 kPa (500psi) before the casing is disturbed in any way, including installation of a blow-out preventer.

(10) A holder must run a radial cement bond evaluation log and monitor the annular pressure to verify that there is adequate cement bond quality on all casing strings and must carry out remedial cementing if the cement bond is not adequate for drilling ahead.

(11) A copy of the cement job log for a cemented casing string in the well must be maintained in the well file as submitted as required in regulation 14(3).

5. Casing string tests

(1) After the setting and cementing of a casing string, except the conductor casing, and prior to further drilling, the casing string must be tested with water fit for use, mud, brine or drilling mud to at least the maximum anticipated treatment pressure but no less than 1.512 kPa per 0.3048 meter (0.22 psi per foot) of casing string length or 10342.12 kPa (1,500 psi), whichever is greater, for a minimum of 30 minutes with less than a 10% pressure loss.

(2) The pressure test must not exceed 70% of the minimum internal yield and if the pressure declines more than 10%, or if there are other indications of a leak, corrective action must be taken before conducting further drilling and fracturing operations.

(3) The pressure under which the well is subjected during the facturing operations must not exceed the test pressure.

(4) A fracturing string used in the operations must be either strung into a production liner or run with a packer set at least 30 meters below the deepest cement top and must be tested to not less than the maximum anticipated treating pressure minus the annulus pressure applied between the fracturing string and the production or immediate casing.

(5) The pressure test must be considered successful if the pressure applied has been held for a minimum of 30 minutes with no more than 5% pressure loss.

6. Formation pressure integrity test

(1) A holder must, after a successful casing string test, conduct a formation pressure integrity test below the surface casing and below the intermediate casing.

(2) The actual fracturing treatment pressure must not exceed the casing test pressure at any time during fracturing operations.

7. Blowout prevention and pressure testing

(1) A holder must install blowout prevention equipment that meets the current API standard 53 for blowout equipment after setting the casing to shut-off a wellhead which must be supported and secured to prevent stresses on all connections.

(2) Blowout prevention equipment installed at a well that may be subject to fracturing must include a remote blowout prevention actuator that-

(a) is powered by a source other than rig hydraulics;

(b) is located as a minimum 20 meters from the well head; and

(c) has an appropriate related pressure equal to or greater than the induced fracture pressure.

(3) Lines, valves and fittings between the blowout preventer and the remote actuator must be flame resistant and must have a working pressure rating higher than the maximum anticipated well heads surface pressure.

(4) Blowout prevention equipment must have 100% availability at all times.

(5) The blowout prevention equipment must be tested to 100% of related working pressure and the annular-type blowout preventer must be tested to 6894.76 kPa (1,000 psi) at the time of installation in accordance with current API standard 53 for blowout equipment.

(6) Blowout prevention equipment that has failed any pressure test must not be used until it is repaired and has passed the pressure test.

8. Mechanical integrity testing and monitoring

(1) The injection lines and manifold, associated valves, fracturing head or tree and any other well head component or connection not previously tested must be tested with water fit for use, mud or brine to at least the maximum anticipated treatment pressure for a minimum of 30 minutes with less than a 5% initial pressure loss.

(2) A record of the pressure test must be maintained and included in the well file.

(3) The pressure exerted on treating equipment including valves, lines, manifolds, fracturing head or tree, casing and fracturing string, if used, must not exceed 95% of the working pressure rating of the weakest component.

(4) A function-tested relief valve and diversion line must be installed and used to divert flow from the fracturing sting-casing annulus to an overhead tank in case of fracturing string failure.

(5) The relief valve must be set to limit the annular pressure to no more than 95% of the working pressure rating of the casings forming the annulus.

(6) The fracturing treatment pressure must not exceed the test pressure of any given component at any time during the fracturing operations.

(7) During fracturing, annulus pressure, injection pressure and the rate of injection must be continuously monitored and recorded.

(8) Micro-seismicity (in real time<5 minute delay) must be monitored by a long array of accelerometers located in an offset monitoring well, situated 100m or more away from the well at a comparable depth.

(9) Micro seismic sensors must be designed for temperatures between 175-200°C.

(10) Tiltmeter measurements must be taken with an array of tiltmeters either located in shallow offset wells (10m) at the site surface or in a more sensitive deep offset well of comparable depth to fracturing depth and in the fracturing well which provides information on fracture orientation and direction.

(11) Downhole pressure sensors must be used to provide indirect measurements of fracture height, which are to be connected to the production casing as well as outer casings to monitor well integrity.

(12) Performing temperatures and flow logging along the length of the well must correlate with information on fracture growth.

(13) Proppants must be tagged with radioactive isotopes so that proppant can be analysed to locate where different stages of the proppant went and to locate fracture at depth.

(14) Chemical tracers must be added to fracturing fluid to improve the understanding of fracture fluid loss and flowback.

(15) Temperatures in the well must be measured to trace fluids from shale formations that are at a higher temperature than shallow fluids using fibre-optic sensors to measure temperature, pressure and sound that provides real-time information on fracture locations in the well (fibre-optic sensors are especially valuable for use in downhole high pressure high T situations where electronic gauges fail).

9. **Well suspension**

A holder may only suspend a well-

(a) after obtaining the approval of the designated; and

(b) for a period determined by the designated agency, which period may not exceed the timeframes as contemplated in subregulation 21(1) and (2).

10. Suspended well integrity management

(1) A holder must ensure that management standards and procedures are in place for monitoring wells that are in suspension phase following drilling and fracturing operations, prior to development phase including the status of the equipment and any annulus pressure.

(2) Procedures must take account of the specific circumstances of the well and must include the reporting criteria for any anomaly and a risk assessment of the anomaly.

(3) The suspension of a well-

(a) must be effected in such a way that the well can be re-entered safely and secured using pressure control equipment, without compromising the barrier in place;

may not jeopardise the future final decommissioning and abandonment of the well.

ANNEXURE C

WATER QUALITY LIMITS FOR DISCHARGE INTO A WATER RESOURCE AND/OR IRRIGATION WITH WASTEWATER

- These water quality limits will be tailored to site specific conditions as part of the water use license.
- Water containing nuclides or radioactive material must not be discharged into a water resource or irrigated on land.

Water Quality limits for Discharge of Water Containing Waste in terms of Section 21(f) of NWA

Parameter	Limit (mg/l)
Acetone (mg/l)	0
Aluminium (mg/l)	5
Ammonia (mg/l)	0.025
Arsenic (mg/l)	0.01
Barium (mg/l)	0.7
Benzene (mg/l)	0
Beryllium (mg/l) found in coal slag	0.004
Boron (mg/l)	0.5
Bromide (mg/l)	0.5
Calcium (mg/l)	32
Cadmium (mg/l)	0.05
Chemical oxygen demand (mg/l)	not exceed 75 mg/l after applying chloride correction
Chloride (mg/l)	5
Chromium (mg/l)	0.012
Chromium (vi) (mg/l)	0.007
Cobalt (mg/l)	0.5
Copper (mg/l)	0
Cyanide (mg/l)	0.001
Diesel (mg/l)	0

Electrical conductivity (milli siemens per m)	Not to be increased by more than 75
Ethyl benzene (mg/l)	0
Feacal Coliform	0
Formaldehyde (mg/l)	0
Fluoride (mg/l)	1
Iron (mg/l)	0.3
Lead (mg/l)	0
Lithium (mg/l)	0.010
Magnesium (mg/l)	0.1
Manganese (mg/l)	0.18
Mercury (mg/l)	0.02
Methane (mg/l)	10
Methanol(mg/l)	0
Molybdenum (mg/l)	0.01
Naphthalene(mg/l)	0
Nickel (mg/l)	0.5
Nitrate/Nitrites (mg/l)	1.5
Ortho-phosphate (mg/l)	1
pH	6.5-8.4
Phenol (mg/l)	0
Potassium-(mg/l)	50
Polycyclic aromatic hydrocarbons (mg/l)	0
Radionuclides (mg/l): $^{228}Ra/^{226}Ra$	0
$S^{18}O$	0
$S^{2}H$	0
Selenium (mg/l)	0.02
Silica (mg/l)	5
Soap, oil or grease (mg/l)	0
Sodium (mg/l)	50
Strontium (mg/l)	0
sulphide (mg/l)	0.05

Temperature (°C)	17-30^{0}C (depends on the type of fish species that is there)
Tin (mg/l)	0.005
Toluene (mg/l)	0
Total dissolved solids (mg/l) Directly proportional to EC	40
Total petroleum hydrocarbons (mg/l)	1
Uranium (mg/l)	0
Vanadium (mg/l)	0.25
Vinyl chloride (mg/l)	0
Xylene (mg/l)	0
Zinc (mg/l)	0.002

Water Quality Limits for Irrigation with wastewater in terms of section 21(e) of NWA

Parameter	**Limit**
Acetone (mg/l)	0
Aluminium (mg/l)	5
Ammonia (mg/l)	1
Arsenic (mg/l)	0.1
Barium (mg/l)	0.7
Benzene (mg/l)	0
Beryllium (mg/l) found in coal slag	0.10
Boron (mg/l)	0.5
Bromide (mg/l)	0.5
Calcium (mg/l)	1000
Cadmium (mg/l)	0.05
Chemical oxygen demand (mg/l)	not exceed 75 mg/l after applying chloride correction
Chloride (mg/l)	5
Chromium (mg/l)	0.5
Chromium (vi) (mg/l)	0.10

Cobalt (mg/l)	0.05
Copper (mg/l)	0
Cyanide (mg/l)	0.5
Diesel (mg/l)	
Electrical conductivity (milli siemens per m)	Not to be increased by more than 75
Ethyl benzene (mg/l)	0
Faecal Coliforms (Colony Forming Units/ml)	0
Formaldehyde (mg/l)	0
Fluoride (mg/l)	2
Iron (mg/l)	0.5
Lead (mg/l)	0
Lithium (mg/l)	2.5
Magnesium (mg/l)	500
Manganese (mg/l)	0.02
Methanol (mg/l)	0
Mercury (mg/l)	0
Methane (mg/l)	10
Molybdenum (mg/l)	0.01
Naphthalene	0
Nickel (mg/l)	0.5
Nitrate/Nitrites (mg/l)	1.5
Ortho-phosphate (mg/l)	1mg/l-
pH	6.5-8.4
Phenol (mg/l)	0
Potassium-(mg/l)	50
Polycyclic aromatic hydrocarbons (mg/l)	0
Radionuclides (mg/l): $^{228}Ra/^{226}Ra$	0
$S^{18}O$	0
$S^{2}H$	0
Selenium (mg/l)	0.02

Silica (mg/l)	5
Soap, oil or grease (mg/l)	0
Sodium (mg/l)	70
sulphide (mg/l)	1
Strontium (mg/l)	0
Temperature (°C)	25^0C (depends on the type of fish species that is there)
Tin (mg/l)	0.005
Toluene (mg/l)	0
Total dissolved solids (mg/l) Directly proportional to EC	40
Total petroleum hydrocarbons (mg/l)	1
Uranium (mg/l)	0
Vanadium (mg/l)	0.10
Vinyl chloride(mg/l)	0
Xylene (mg/l)	0
Zinc (mg/l)	1