

Regulation for Hydraulic Fracturing in Unconventional Resources Exploration in Brazil

Regulação para a Exploração do Fraturamento Hidráulico em Recursos não Convencionais no Brasil

Reglamento para la Explotación de Fracturación Hidráulica en Hidrocarburos no Convencionales en Brasil

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Abstract

In Brazil, it is not yet possible to use hydraulic fracturing (fracking) to explore unconventional resources. Given (i) the attempt to bid unconventional areas in 2014; and (ii) the regulation of this exploration technique in the same period, discussions about the feasibility of this economic activity in the country emerged. National Agency of Petroleum, Natural Gas, and Biofuel promoted discussions with society on the subject. This article analyzed the regulatory processes of hydraulic fracturing in unconventional resources in Brazil to understand sensitive points to implement this practice in the country. By analyzing the processes and procedures adopted by the competent entities, especially the ANP, it was possible to understand how the regulatory process happened to glimpse improvements that may enable this activity in the future. The study result demonstrated that the first national implementation attempt preceded a specific norm to regulate the activity. However, the administrative processes that led to the 12th ANP Bidding Round and the preparation of ANP Resolution No. 21/2014 show that this was not even a sensitive point in employing these operations. The study concluded that, although there is room for regulatory improvement, the main obstacle to exploring this activity stems from the incipient geological data at the time of the 2014 bidding round.

Keywords: Hydraulic fracking; Regulation; Non-conventional resources.

Resumo

No Brasil, ainda não é possível utilizar o fraturamento hidráulico como técnica para exploração de recursos não convencionais. Ante a tentativa de licitação de blocos em áreas não convencionais em 2013, e a regulamentação dessa técnica de exploração em 2013-2014, vieram à tona discussões sobre a viabilidade desse tipo de atividade econômica no país, tendo a Agência Nacional de Petróleo, Gás Natural e Biocombustíveis (ANP) atuado de forma a promover discussões com a sociedade sobre o tema. Esse artigo propôs a análise dos processos de regulamentação do fraturamento hidráulico em recursos não convencionais no Brasil para compreender pontos sensíveis ao exercício dessa prática no país. Por meio da análise dos processos e procedimentos adotados pelos entes competentes, notadamente da ANP, foi possível compreender como se deu o processo de regulamentação de forma a vislumbrar aprimoramentos que possam viabilizar essa atividade no futuro. Na análise, observou-se que o primeiro intento nacional precedeu à estruturação de uma norma própria para regular a atividade. Contudo, análises dos processos administrativos que conduziram a 12ª Rodada de Licitações da ANP e da elaboração da Resolução ANP nº 21/2014 evidenciam que este sequer foi um ponto sensível à implementação dessas operações. O Estudo concluiu que, em que pese haver espaço para aprimoramento

regulatório, o principal óbice à exploração dessa atividade decorre da incipiente dos dados geológicos à época do certame de 2014.

Palavras-chave: Fraturamento hidráulico; Regulação; Recursos não-convencionais.

Resumen

En Brasil aún no es posible utilizar la fracturación hidráulica como técnica para explotar hidrocarburos no convencionales. Ante el intento de licitación de bloques en áreas no convencionales en 2013, y la regulación de esta técnica de exploración en 2013-2014, salieron a la luz discusiones sobre la factibilidad de este tipo de actividad económica en el país, con la Agencia Nacional del Petróleo, Gas Natural y Biocombustibles (ANP) para promover discusiones con la sociedad sobre el tema. Este artículo propuso el análisis de los procesos regulatorios de la fracturación hidráulica en hidrocarburos no convencionales en Brasil para comprender puntos sensibles al ejercicio de esta práctica ahí. A través del análisis de los procesos y procedimientos adoptados por las entidades competentes, en particular la ANP, fue posible comprender cómo se desarrolló el proceso regulatorio para vislumbrar mejoras que viabilicen esta actividad en el futuro. En el análisis, se observó que el primer intento nacional precedió a la estructuración de una norma específica para regular la actividad. Sin embargo, los análisis de los procesos administrativos que condujeron a la 12^a licitación de la ANP y la elaboración de la Resolución ANP N° 21/2014 muestran que ese ni siquiera fue un punto sensible en la implementación de estas operaciones. El estudio concluyó que, si bien hay espacio para la mejora regulatoria, el principal obstáculo para la exploración de esta actividad proviene de los incipientes datos geológicos al momento del evento de 2014.

Palabras clave: Fracturación hidráulica; Reglamento; Hidrocarburos no convencionales.

1. Introduction

It is necessary to weigh if the benefits are greater than the costs when analyzing the feasibility of exercising an economic activity with potential negative externalities. Based on this premise, some countries chose to exploit natural resources in unconventional reservoirs through hydraulic fracturing, which would bring energy security despite the potential risks of environmental and social impact. From this premise, it is observed that it is essential that the agent is provided with as much information as possible so that he can adequately make the cost-benefit analysis necessary for decision-making regarding the possibility of exploitation of unconventional resources.

Hydraulic fracking is a technique that uses the pumping of water in large volumes at high pressures to open microcracks in the rock to allow it to release the hydrocarbons retained in it, nodded shale gas. Considering these characteristics, it is not difficult to understand why the extraction of unconventional resources through hydraulic fracturing activity arouses fear in society and experts around the world. The relevant detail that explains the operation's complexity stems from the rock's very low permeability, which ranges from 0.01 to 0.00001 miliDarcy (mD), which would be more rigid than a granite stone (ANP, 2013).

In the United States of America, a country considered a reference in the implementation of these activities, hydraulic fracturing for the exploitation of unconventional resources dates to the 1940s. However, the use of more modern techniques for exploration, such as drilling horizontal wells, use of support agents – substances that keep the crack open to enable the extraction of gas – and large volumes of water, is relatively recent, dating back to the mid-1990s (Howarth et al., 2011).

In Brazil, this method of exploitation dates to the 1950s, when it was used to extract conventional resources in the Recôncavo Basin (ANP, 2013). Even though using this technique to enable the exploitation of unconventional resources has not yet been explored, it has been the subject of further discussion under Administrative Procedure No. 48610.003442/2013. This Administrative Procedure dealt with the 12th Bidding Round, and later in Administrative Procedure No. 48610.010646/2013, both conducted by the ANP. It is possible to observe how the American experience guided the Brazilian regulator to regulate the theme in both cases, but the Brazilian result was different.

Despite discussions about the follow-up to the formal procedure for regulation of unconventional gas, such as public hearings and consultations, it was not clear to society that, at the proposed time, the exploitation of conventional resources would bring more benefits than costs in Brazil.

Thus, this work aims to analyze the processes in which there were more robust discussions on the regulation of the

exploitation of unconventional gas by hydraulic fracturing. The objective is to understand the reasons that prevented the use of this technique in the country.

For this, section 2 presents a 12th Bidding Round of the ANP description to understand which questions were raised for the non-follow-up of exploring the blocks where there could be hydraulic fracturing. Section 3 examines the process of regulating the use of hydraulic fracturing techniques in unconventional resources, verifying the use of formal criteria (legal and regulatory forecasts) to standardize the issue, as well as subject discussions. Section 3.1 makes a brief analysis of the regulation of hydraulic fracturing in the United States of America to verify the possible influence of U.S. regulations in Brazil.

After analyzing the points above, section 4 brings formal and material considerations about the Bidding Process of the 12th Round and the preparation of ANP Resolution 21/2014. Finally, section 5 brings conclusions about possible improvements necessary to enable this activity.

2. Methodology

This article intended to analyze the discussions within the 12th Round and the elaboration of ANP Resolution No. 21/2014 to verify the reasons that made the implementation of hydraulic fracturing in unconventional resources in Brazil unfeasible. To this end, it was necessary to request, through the federal access to information system, the National Agency of Petroleum, Natural Gas and Biofuels (ANP), access to the administrative processes where the aforementioned topics were discussed.

After obtaining the administrative processes, a qualitative analysis of their content was carried out; in order to make considerations about the progress of both and which factors hampered the exercise of the activity.

Subsequently, a bibliographic research was made to understand the development of the theme in the United States of America (USA), since (i) the legislation and treatment of the theme served as a reference for the ANP to conduct the discussions in Brazil; (ii) hydraulic fracturing in unconventional resources is widely explored and already regulated in the country. As Marconi and Lakatos (2002) teach, collecting data through bibliographic research is essential for understanding the topic, planning the work, as well as avoiding duplication and errors, which is why this methodology was adopted to understand the theme's development in the USA.

Subsequently, after understanding the history of the theme in Brazil and in the USA, a comparative analysis was structured, focusing on the identification of key variables (Lijphart, 1971) to apprehend factors that may have contributed to the implementation or unfeasibility of the activity.

With the analysis of the two scenarios and a special focus on the analysis resulting from the administrative processes where there was a discussion of hydraulic fracturing in unconventional resources in Brazil, it was possible to understand which factors were fundamental to the infeasibility of the activity in the country.

3. The 12th Bidding Round for Concession Contracts for Oil and Natural Gas Exploration and Production Activities Granting

Authorized by resolution of the National Energy Policy Council No. 6/2013, the 12th Bidding Round of blocks for the exploration and production of oil and natural gas (12th Round) was announced on August 31, 2013, in the Official Gazette. CNPE Resolution had an express mention of unconventional resources as the object of the round, see (CNPE, 2013):

I - one hundred and ten exploratory blocks in areas of New Technological Frontiers and Knowledge in the Basins of Acre, Parecis, São Francisco, Paraná, and Parnaíba, to attract investments to regions still little known geologically or

with technological barriers to be overcome, enable the emergence of new basins producing natural gas and conventional and unconventional **petroleum resources, totaling 164,477.76 km² of the area;** and

II - one hundred and thirty blocks in the Ripe Basins of the Recôncavo and Sergipe-Alagoas, to offer exploratory opportunities in these areas, in order to enable the continuity of exploration and production of natural gas from conventional and unconventional petroleum **resources contained in these regions, totaling 3,870.66 km² of area.**" (griffin)

Therefore, CNPE expressly predicted as the object of granting the exploitation of unconventional resources, emphasizing the areas of "New Technological and Knowledge Frontiers," aimed at attracting investments to enable the deepening of information on these areas still little geologically known (CNPE, 2013).

To publish the terms proposed for the event, Public Consultation (CP) no. 25/2013 was opened, giving 20 days to present contributions about the draft and contracts for the 12th Round (ANP, 2013a). The consultation received 156 contributions from 13 stakeholders (ANP, 2013a). Subsequently, a Public Hearing (AP) was held on September 18, 2013, with 150 people present. After the opening of the event by ANP representatives, five people made contributions as exhibitors, being, for the most part, against to the adoption of hydraulic fracturing in unconventional resources due to the risks linked to the activity¹² (ANP, 2013a).

Despite the disagreement statements in the Public Hearing and Consultation, on November 28, 2013, the public session for bid offers of the 12th round took place (ANP, 2013a). Of the 240 blocks proposed, 72 were claimed, totaling 47,427.60 km² of area (ANP, 2013a). The 12th round public notice and CNPE Resolution stated that there was no certainty to the exploitation of unconventional resources, which could or could not be an activity performed by the grant holders³⁴ (ANP, 2013a).

The contract draft contained the definition of "unconventional resource" to address the risks of unconventional reservoirs. The clauses emphasized the possibility of using particular extraction technologies in these cases, such as i) horizontal or high-angle wells; (ii) hydraulic fracturing or; iii) retort heating⁵ (ANP, 2013a). In addition, the contract draft provided that, in case of identification of non-conventional resources, it would be possible to extend the exploration phase, called "Extended Exploration Phase" see:

5.2 If the Concessionaire makes a Discovery of Unconventional Resources, recognized by the ANP during the Exploration Phase, the Concessionaire, in its sole discretion and by the Best Practices of the Petroleum Industry, may proceed in the Extended Exploration Phase, whose duration, at the discretion of the ANP, may reach up to 6 (six) years, divided into 3 (three) Extended Exploratory Periods with up to 2 (two) years of duration each.

5.2.1 Each Extended Exploratory Period is restricted and conditional:

- (i) the Concession Area where there is evidence of the occurrence of Unconventional Resources;
- (ii) the ANP's recognition of the Non-Conventional and;
- (iii) ANP's approval of the Plan for the Exploration and Evaluation of Unconventional Resources and its revisions.

¹ Of the 36 contributions presented: i) 36 turned to the draft of the notice, 19 rejects, six partially accepted, and 11 accepted; (ii) 120 turned to the contractual draft.

² According to the Minutes of the Public Hearing available, after the manifestation of the representatives of the ANP, contributed as exhibitors: i) representative of the Internationalist Front of the Homeless (FIST); ii) representative of CGG Veritas; iii) representative of the Brazilian Institute of Oil, Gas, and Biofuels (IBP); iv) representative of the Petrobras Engineers Association (AEPET); (v) Single Workers' Centre (CUT).

³ "The blocks that are the bid object are located in sedimentary basins with potential for oil and natural gas. The exercise of the exploration and production activities of Oil and Natural Gas are foreseen in conventional petroleum systems, also enabling to carry out exploration and production activities in Unconventional Resources according to contractual provisions and Applicable Legislation." (griffin)

⁴ In Technical Note 345, which introduced the draft resolution on the exploitation of unconventional resources by hydraulic fracturing technique, this point is highlighted: "It is observed, therefore, that the 12th Bidding Round has as its proposal the exploration and production of natural gas on land, without specific focus on unconventional resources, despite contemplating this possibility. One of the 12th Round objectives is to reduce uncertainty regarding conventional and unconventional resources in Brazil."

⁵"1.3.46 Unconventional Resource: accumulation of Oil and Natural Gas which, unlike conventional hydrocarbons, is not significantly affected by hydrodynamic influences and is not conditioned to the existence of a geological structure or stratigraphic condition, normally requiring special extraction technologies such as horizontal or high-angle wells and hydraulic fracturing or retort heating. This definition includes extra-heavy oil, extracted from bituminous sands ("sand oil" or "tar sands"), from oil shale ("shale oil"), organic oil shale ("oil shale" or bituminous shale), and formations with very low porosity ("tight oil"). The definition is also considered to be methane gas from coal bed methane and methane hydrates, as well as natural gas extracted from gas shale gas ("shale gas") and formations with very low porosity ("gas-tight")."

5.2.2 The Exploration Phase will be automatically suspended until the ANP deliberates on the Unconventional Resource Exploration and Evaluation Plan.

5.2.2.1 During the suspension, the Concessionaire, may only perform exploratory activity contained in the Plan for Exploration and Evaluation of Unconventional Resources upon prior and express authorization of the ANP.

Moreover, the seventh article predicted that in case of identification of unconventional resources a "Plan for the Exploration and Evaluation of Unconventional Resources" should be presented to the ANP for approval, which should include, including, "Pilot Projects to verify the Commerciality of the Discovery of Unconventional Resources"⁶ (ANP, 2013a).

Regarding the risks to water resources arising from the exploitation of non-conventional resources, the contract brought specific caveats:

21.2.1 When operating and producing Unconventional Resources, the Concessionaire, following applicable legislation, shall:

- (a) ensure the integrity of hydraulic wells, coatings, cementations, and fracturing in order to preserve the quality of aquifers, groundwater, soil, and subsoil; and
- b) Ensure the integrity of the processes of capture, use, treatment, reuse, and disposal of water, fluids and other materials related to hydraulic fracturing operations (ANP, 2013a).

There were also predictions regarding legal, financial, and technical requirements to enable the use of the hydraulic fracturing method set out in Annex XI that are didactically summarized below (Araújo, 2016):

The concession contract also required from the Concessionaire, before the ANP, a new legal, financial, and technical qualification specific for the operation and production of non-conventional resources. This qualification required the demonstration of minimum equity equivalent to three times the equity required for qualification as Operator C, fixed at R\$3.8 million, and the completion of a technical summary attesting to the minimum experience of five years in exploration activities production of non-conventional resources. The Concessionaire should prove its experience in performing the hydraulic fracturing technique or that it would hire a service provider providing the necessary technological know-how, considering the following criteria: fracturing; well scan swell; capture, use, treatment, reuse, and disposal of water; environmental licensing; and involvement and awareness of civil society in the process of exploitation and production (ANP, 2013b).

With the 12th round conclusion, notwithstanding its result has granted rights to the winners, lawsuits were filed in several states seeking to cease the effects of the auction, specifically concerning the possibility of exploitation of unconventional resources through the adoption of the hydraulic fracturing technique (ANP, 2013). The practical effect of judicialization was that this method of production became not viable, despite the terms of the auction and contracts. The table below contains some of the actions - available on the ANP page (ANP, 2013a) - proposals:

⁶ Plan for Exploration and Evaluation of Discovery of Unconventional Resources

7.6 If the Concessionaire decides to evaluate a Discovery of Unconventional Resources recognized by the ANP, it shall submit a proposal for an Exploration and Evaluation Plan for Unconventional Resources and its revisions to the approval of the ANP under applicable legislation.

7.7 The Plan for the Exploration and Evaluation of Unconventional Resources shall include all exploratory and evaluation activities for the retained Concession Area, including the Pilot Projects for verification of the Commerciality of the Discovery of Non-Conventional Resources.

Table 1 – Legal suits filed against the exploitation of unconventional resources in Brazil.

Legal Suit Number	Location	Decision
Public Civil Action No. 5005509-18.2014.404.7005	Paraná Basin	“nullity of the bidding procedure and the respective contracts signed regarding the areas of the Paraná River Basin (SPAR-CS sector), as well as determining to the NATIONAL PETROLEUM AGENCY, NATURAL GAS, AND BIOFUELS - ANP that refrains from performing bidding procedures and entering into concession contracts in the areas of the Paraná River Basin (SPAR-CS sector), without prior realization of the Environmental Assessment of Sedimentary Areas - AAAS concerning the Paraná Hydrographic Basin”
Public Civil Action No. 080036679.2016.4.05.8500	Sergipe-Alagoas Basin	“suspension of the effects resulting from the 12th Bidding Round carried out by the ANP, only concerning the exploration of shale gas, known as “shale gas,” in the fracking modality (hydraulic fracturing), in the Sergipe-Alagoas Basin, due to the potential risks to the environment, human health and regional economic activity, as long as there are no environmental impact studies and the due publicity of the AAS Environmental Assessment of Sedimentary Areas”
Public Civil Action No. 0030652-38.2014.4.01.3300	Recôncavo Basin	“SUSPEND exclusively in relation to activities involving the exploration of shale gas through hydraulic fracturing the effects arising from the 12th bidding round promoted by the National Agency of Petroleum Natural Gas and Biofuel ANP that made available blocks in the Recôncavo Basin for the exploration of shale gas through hydraulic fracturing Sector SRECT2 and SRECT4 as well as the contracts arising from it as long as there is no prior regulation of CONAMA the Environmental Assessment of AAAS Sedimentary Areas is carried out in the form of Interministerial Ordinance No. 198/2012; b) prevent the ANP from carrying out new bidding procedures related to the exploration of shale gas in the Recôncavo Basin and from authorizing the signing of contracts relating to such activity until the steps described in the preceding item have been performed; c) to determine that the ANP advertises the present demand by consigning its existence in concession contracts whose effects are intended to be suspended as well as on its institutional website and in Brazil Rounds Oil and Gas Bids”
Public Civil Action No. 0005610-46.2013.4.01.4003	Parnaíba Basin	“suspension of all acts resulting from the auctioning of the PN-T-597 block belonging to the Parnaíba Basin, about the exploitation of shale gas (unconventional gas), and that the National Petroleum Agency - ANP and the Union refrain from carrying out other bidding procedures to operate the same gas in the Parnaíba basin, until the Environmental Assessment of the sedimentary area - AAAS, provided for in the Interministerial Ordinance no. 198, of 04/05/2012 of the Ministry of Mines and Energy, is carried out”

Source: (ANP). Adapted by authors (2022).

The judicial decisions stated that the precautionary principle could not prevail over the precautionary principle, leading to the suspension of the possibility of exploitation of the unconventional resources tendered and nullity of the 12th Bidding⁷ Round (ANP, 2013a). However, it should be noted that the judicial proceedings did not prohibit the use of the hydraulic fracturing technique but brought conditions to its occurrence to prevail the precautionary principle. The conditions imposed the following requirements: i) realization and presentation of Environmental Assessment of Sedimentary Area - AAAS, provided for in Interministerial Ordinance no. 198, of 04/05/2012 of the Ministry of Mines and Energy; and ii) CONAMA regulations on the subject.

⁷ "The precautionary principle includes the "concept of avoidability and prevention of environmental damage," "it is not a question of protection against danger or mere risk"; fighting the event itself – pollution, accidents, leakage – the natural resource can be enjoyed based on the duration of its income, taking into account, however, that it is endable. [...]. The similarities between the precautionary and prevention principle consist essentially in that, for the former, in the face of human activities, whether two behaviors are taken, or if it favors risk prevention, it is worth saying, if it is not known what will happen, one should not act, or whether it privileges risk and the acquisition of knowledge at any price, that is, if you don't know what's going to happen, you can act, and in the end, you'll know what to do. "(FARIA et al., 2019). Therefore, it is observed that the precautionary principle supported judicial action to the extent that it was understood as in that the risks would not outweigh the benefits of uncertainty regarding the exploitation of the activity.

4. ANP Resolution No. 21/2014

ANP Resolution No. 21 entered into force on November 11, 2014 (RANP 21, 2014), published in the Official Gazette. As stated in Article 1 of this standard, it establishes the requirements to be met by the holders of rights of Exploration and Production of Petroleum and Natural Gas that will perform the hydraulic fracturing technique in unconventional reservoirs. It is essential to consider the history of the 12th Round when discussing the RANP 21 (2014) as both took place in the same period. This reflection is relevant because, as provided for in Proposal for Action No. 1132/2013 (ANP, 2013b), the auction was the fact that led to the establishment of the Administrative Procedure to propose this resolution:

The 12th Bidding Round aims to offer exploratory opportunities on land with potential for natural gas production to enable the continuity of exploration and production of this resource from conventional and non-conventional reservoirs. Thus, it is necessary to develop regulations that meet the peculiarities of hydraulic fracturing, a technique for exploiting unconventional resources. Thus, the draft Resolution is proposed that "Establishes the criteria for drilling wells followed using the unconventional hydraulic fracturing technique. (griffin)

Therefore, while discussing the terms of the round, in October 2013, a Proposal for Action (PA) was opened in ANP, with the aim of regulating "unconventional hydraulic fracturing". The PA was clear in stressing the importance of regulating the theme, in view of the opportunities for exploitation of unconventional resources that would be available in the 12th Bidding Round.

Technical Note No. 345/SSM/2013 (Technical Note 345), prepared by the Superintendence of Operational Safety and Environment (SSM), which instructed the PA, pointed out Law No. 9,478/97 as the legal basis for the new regulation. Law No. 9,478/97 imposed on ANP alignment with the principle of preservation of the environment (art. 1, I-IV) and established the agency's competence to articulate with local environmental and regulatory bodies. CNPE Resolution No. 8/2003 was also considered important, as it defines the guidelines that should guide ANP articulation (Art. 2º, V). In addition, Technical Note 345 highlighted the purpose of the proposed regulation⁸⁹¹⁰.

[...] the main objective is to develop a proposal for a regulation that enables the safe use of resources, prioritizing human health, environmental protection, and quality of life, without, however, advancing the attributions of the other public agents involved (ANP, 2013b).

Despite the interest of SSM in enabling the experimental technique, it was evidenced that the associated risks were not disregarded, as the American experience was used as a reference for accounting for risks and challenges, as well as mitigating measures¹¹ (ANP, 2013b). In that regard, the initial resolution draft addressed: i) risk of contamination of potable water – by

⁸ Art. 1 . National policies for the rational use of energy sources will aim at the following objectives:

I - preserve the national interest;
II - promoting development, expanding the labor market, and valuing energy resources;
III - protect the interests of the consumer in terms of price, quality, and supply of products;
IV - protect the environment and promote energy conservation;

⁹ XXVIII - liaise with state and environmental regulatory bodies, aiming to make the standards applicable to the natural gas industry and markets compatible (Included by Law No. 11,909, 2009)

¹⁰ V - select areas for bidding, adopting possible exclusions of areas by environmental restrictions, supported by a joint demonstration of the ANP, the Brazilian Institute of the Environment and Renewable Natural Resources - IBAMA and state environmental agencies; and (Repealed by Resolution No. 17 of 8 June 2017.)

¹¹ "However, there are reports of contamination and other problems in the areas where hydraulic fracturing activities are being carried out, especially in the USA. These cases served as a reference for the elaboration of the Resolution, the extent to which they allowed to identify the causes and mitigating measures of the damage reported, in order to contemplate them in the regulation." (Technical Note SSM/ANP No. 345/2013).

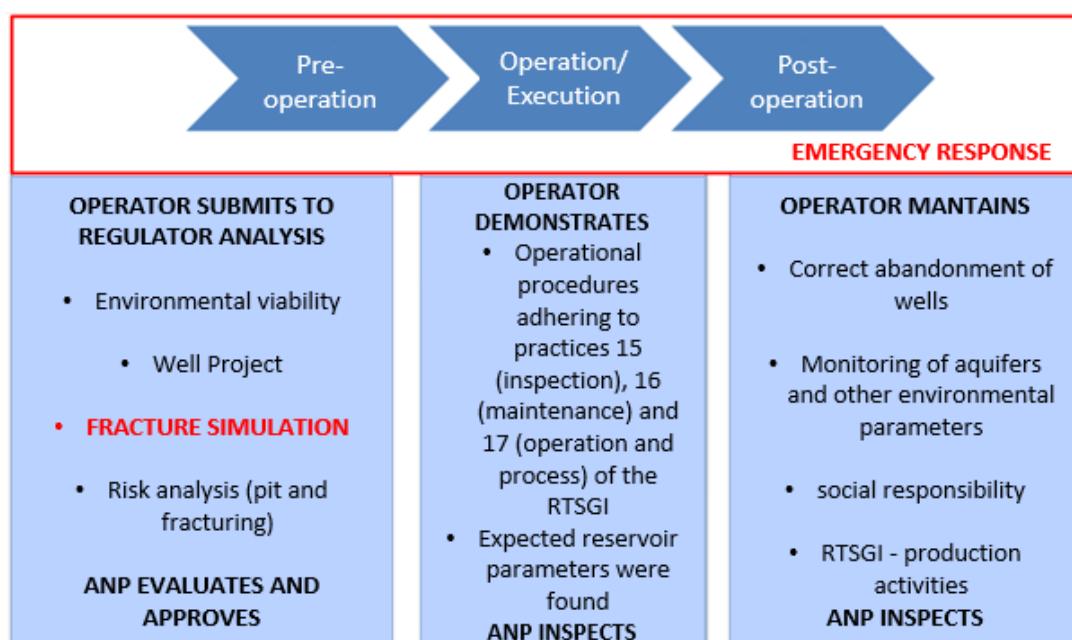
methane and ethane, or contaminants present in the material used for fracturing; (ii) obligations relating to the cementation and coating of the well in the same direction; and (iii) high volume of water use and incentives for water reuse¹² (ANP, 2013b).

After describing the risks of the activity under discussion, the technical note states that international references were used to define three main requirements of the operators:

- i. environmental management system: The approval of the performance of the activity will be conditional on the fulfillment of several requirements, whose objective is to verify whether the conditions necessary for the use of energy resources are within environmentally and socially acceptable conditions. This implies, among others, the Operator's obligation to ensure that the activities to be carried out will not have negative impacts on aquifers, other bodies of water, and soil in the region. In addition, the Operator will be urged to maintain effluent management that reduces water consumption in operations as much as possible and allows the treatment and reuse of water, preferably in other hydraulic fracturing activities;
- ii. unconventional hydraulic fracturing project: in addition to the requirement to use coatings specifically designed for the hydraulic fracturing environment, it must be proven that cementation reaches acceptable qualitative and quantitative parameters and that the well will be fully coated in the pre-production phases. The coating is the set of steel pipes installed after drilling to isolate the well walls from the injected and extracted fluids. The simulation of fractures and geomechanical studies, carried out through specific software, will be presented in advance to ensure that there will be no extensive propagation of fractures;
- iii. operational safety management system like those already required by the ANP, contemplating the specific characteristics of hydraulic fracturing operations, whose objectives are risk mitigation, the correct use of work procedures, the maintenance of structural integrity of equipment, among others. Risk analyses associated with operations will also be submitted to the ANP. Thus, the Concessionaire must prove to the regulatory body, technically, that all its operations are safe and present a degree of tolerable risk. In turn, the ANP will authorize operations only if it finds, through technical evidence, the existence of ideal conditions for the continuity of activities (ANP: 2013b).

Said otherwise, the Agency has structured the regulation into three axes, as illustrated in the figure below:

Figure 1 - AP CP Regulation Proposal No. 30/2013.



Source: ANP (2013).

¹² In the continuation of this research, more compelling evidence was presented, relating the presence of contaminants by hydrocarbons, mainly methane and ethane, to the proximity of natural gas wells (9). From the results found, the team of researchers suggests that there are multiple sources of hydrocarbons contributing to the contamination. Contamination may result from (i) design failures or execution of laying of coatings, allowing the migration of gases from the inside of the well to the soil; (ii) cementation failures, generating external conduits to the coating, allowing volumes of natural gas to migrate from deeper layers to the surface or body of water; (iii) the possibility of migration of the gas released during fracturing or (iv) fracturing by connecting the hydrocarbon carrier formation to existing wells (9).

Considering the terms proposed by the competent Superintendency, on October 15, the Attorney's General Office analyzed the proposed action through Opinion No. 613/2013/PF-ANP/PGF/AGU. On the opinion, the responsible Attorney did not oppose the regulatory proposal (ANP, 2013b). With the approval of the Attorney General's Office, and later the Board of Directors, the draft resolution was made available at the Public Hearing and Consultation No. 30/2013¹³.

As the discussions regarding new regulation occurred in parallel with the 12th Round, organizations that did not agree with the activity proposal acted to derail the two processes under discussion in the ANP (ANP, 2013b). On November 19, 2013, the National Association of Environmental Specialist Career Employees (ASIBAMA) notified ANP in the administrative process 48610.010646/2013-76, requesting information about the Round and on the proposed regulation, as described below:

- 1) Was the Announcement of the 12th Bidding Round of the ANP preceded by a basic project that considered the environmental impacts of the hydraulic billing activity?
- 2) Was the Announcement of the 12th Bidding Round of the ANP preceded by any other equivalent environmental feasibility study?
- 3) If yes to items 1 and 2, where is the study for access and copying already required?
- 4) What are the reasons for the continuation of 12? ANP Bidding Round without observing the technical weightings of GTPEG Opinion No. 3/2013
- 5) What are the reasons of the ANP to equate, before the 12th Bidding Round, the serious environmental impacts related in Chapter I of this notification, which is: 5.1) Induction of seismic shocks; 5.2) Risk of contamination of consumers of the same water tank by methane, ethane, propane, and other toxic substances, including carcinogens; 5.3) Contamination of the environment by contaminated water discarded on the surface; 5.4) Risk of explosions in the water wells of consumers of the same water tank; 5.5) A large decrease in the number of water resources available in the region of the enterprise and dispute between users; 5.6) Extensive itinerant territorial occupation? (ANP: 2013b).

As noted above, the association's claim was based on the alleged underestimation of the risks related to the use of hydraulic fracturing in non-conventional resources. The association believed that the Agency had disregarded the Opinion Interinstitutional Working Group on Exploration and Production activities of Oil and Gas (GTPEG) No. 3 of 2013 when editing the regulation. This interinstitutional opinion recommended a further study on the risks and conditions related to the exploration of hydraulic fracturing¹⁴ (ANP, 2013b).

From October 18 to November 18, a deadline was opened for submitting contributions on the draft resolution proposed by the ANP. After the 30 days, 195 contributions were received, most of them on Articles 1, 9, and 13, which deal with the environmental management system (ANP, 2013b¹⁵).

¹³ Board Resolution No. 1108/2013

Date: 16/10/2013

SUBJECT: Consultation/Public Hearing - Proposed Regulation for Unconventional Hydraulic Fracturing

RESOLUTION: The Board of Directors of the National Agency for Petroleum, Natural Gas and Biofuels - ANP, based on Proposal for Action No. 1132 of October 14, 2013,

RESOLVE: Authorize the public hearing, preceded by a public consultation for 30 (thirty) days, referring to the proposed regulation for unconventional hydraulic fracturing.

¹⁴Technical Note 345 recognized several severe environmental impacts but disregarded the GTPEG opinion itself; it was repeated by technical servers of MMA, IBAMA, and ICMBio. In August 2013, GTPEG was surprised by the publication in the Official Gazette of CNPE Resolution No. 6 of June 25, 2013, which authorizes the holding of the 12th Bidding Round of blocks for the exploration and production of oil and natural gas. That is, strangely and hastily, the ANP is beginning the exploration of unconventional gas, disregarding OPINION GTPEG No. 03 of 2013, a reference document of the Brazilian State itself on the issue.

¹⁵ "And now let us go to the query data and the audience. From all that set of comments that we received, we distributed the comments in this chart; we can see below the article number and the number of contributions each article received in the vertical line. We can observe that we received the most significant comments and suggestions for modification: Article 1, Article 9, and Article 13.

These articles have a lot to do with the issue of the Environmental Management System. Furthermore, it was expected that they would be approached. They and three too. Three, which deals with the issue of water reuse, which is the management system itself." (ANP, 2013)

Later, on November 21, 2013, public hearing no. 30/2013 took place in Rio de Janeiro-RJ, where agents were able to, in person, express themselves on the terms of the regulation that was being proposed¹⁶ (ANP, 2013b). The manifestations majority in this event were agents opposed to the regulation, indicating that their risks would be greater than the expected benefits (ANP, 2013b). However, even if the AP 30 objective was the regulation for obtaining unconventional resources through hydraulic fracturing, many contributions focused on the 12th Round.

After the discussions with society promoted by the public hearing and consultation, there were still discussions in parallel in the context of Administrative Procedure 48610.010646/2013. Due to the previous notification of ASIBAMA, the Agency presented a response through Letter No. 198/2013/GAB-ANP and TECHNICAL Note SEP No. 007/2014, developed by the Exploration Superintendence (SEP). In the Office Letter 198, ANP stated that the GTPEG's opinion was considered, and that the result of this was the cutout of the wells proposed in the 12th Round, and that it would also have communicated with the National Indian Foundation (FUNAI) to carry out the terrain layout¹⁷.

By Technical Note 7 (ANP: 2013b), the Agency's manifestation was more robust on the technical points brought by ASIBAMA, being divided into i) induction of seismic shocks; (ii) aquifer contamination; and (iii) surface effects. On the first point, information was presented on the correlation between seismicity and hydraulic fracturing in unconventional resources, highlighting that research shows that its occurrence is low and not¹⁸ significant (ANP, 2013b). Also, concerning the seismicity, it was highlighted that one of the sensitive points of the discussions is that, to model the possible scenarios related to its occurrence adequately it is necessary to effectively drill the well.¹⁹

About the aquifer contamination, the technical note explains that the reference used to talk about the contamination by enlargement of fractures was misinterpreted since the author indicates that this possibility is remote due to the distance between both (ANP, 2013b). The importance of cementation and wall cladding was also emphasized to mitigate the risks of water resources contamination. On surface uses, the technical note answered about the rival use of water for fracking and proposed that no specific study on the "impact of water withdrawal on its sources of supply"²⁰ (ANP, 2013b) would be dispensed.

Subsequently, considering the contributions submitted in the context of the Public Hearing and Consultation No. 30/2013, technical note no. 074/SSM/2014 (Technical Note 74) was prepared, consolidating the accepted propositions, partially accepted, or rejected, and the new draft of the proposed standard (ANP: 2013b). The new wording increased the Operator's requirements in terms of transparency, management of risks related to coating and cementation, drilling and seismicity

16 According to the Minutes of the Public Hearing made available, after the manifestation of the representatives of the ANP, contributed as exhibitors: i) representative of the Association of Petrobras Engineers - AEPET; ii) representative of the National Association of Career Employees of National Environment Specialist (ASIBAMA); iii) representative of ASIBAMA of Rio de Janeiro; iv) public servant of the Brazilian Institute of Environment (IBAMA); v) representative of the Union of Oil Tankers of the State of Rio de Janeiro (SINDIPETRO); vi) representative of the Union of Oil Tankers of Norte Fluminense (SINDIPETRO/NF); vii) representative of the Internationalist Front for the Homeless; viii) representative of the Oswaldo Cruz Foundation (FIOCRUZ).

17 The ANP met all the clipping proposals related to the areas on offer, forwarded by the state environmental agencies and the Interinstitutional Working Group on Exploration and Production Activities of Oil and Gas GTPEG.

The Agency has as a guide criterion about Indigenous Lands not to offer to bid any area overlay to these territories. In the case of the 12th Bidding Round, mainly due to isolated Indians in areas of the Acre basin, the ANP asked FUNAI to appear on the proposed blocks. Based on the guidance of the General Coordination of Isolated and Newly Contacted Indians, the ANP adjusted blocks AC-T-8, 9, 10, and 11, in the Acre basin, according to the polygon provided by the Foundation itself.

18 "It should be noted, however, that the number of cases in which the increase in the number of seismic shocks is at first linked to injection into discard wells is relatively tiny compared to the number of wells of this species currently active in the United States, which does not invalidate the concern and possible associated damage.

19 "The construction of a reliable geomechanical model to predict the occurrence of earthquakes derived from the reactivation of faults due to injection or fluid production is a somewhat complex task, given that not all the necessary elements are available, especially in the early stages of area evaluation. [...] Because obtaining many of the data depends on drilling wells, the development of a previous model is impaired. Even if the data is obtained after the first wells, the model continues to carry considerable uncertainty due to variation of properties and even the State of stresses "in situ" in sand sands. There are cases where, for example, even the stress regime varies along the reservoir, due to tectonism and the pore pressure gradient, from regular regime at the top of the reservoir to transgressive at the edges."

20 Thus, it is necessary that, in the case of an unconventional deposit development project in Brazil, for which it is imperative to apply hydraulic fracturing, studies are carried out on the impact of water withdrawal on its sources of supply.

assessment, among others. After brief discussions between the Attorney General's Office and the SSM, the draft was forwarded to the Directors' Board, which through Board Resolution No. 345/2014 approved the Resolution.²¹²²²³²⁴²⁵

On March 13, 2014, ASIBAMA again sent a letter to ANP, claiming that many aspects of its' previous letter were not addressed and requesting answers. The main question of ASIBAMA was about the previous use of hydraulic fracturing in unconventional resources in Brazil mentioned by ANP. When ANP answered ASIBAMA letter, through SSM and SEP, the new norm to regulate hydraulic fracturing for unconventional resources have come into force: Resolution ANP No. 21/2014. Considering that, ANP used the new concept of unconventional resources hydraulic fracturing to answer ASIBAMA, highlighting that this type of exploitation would not have occurred in the country. The letter also clarified that preliminary activities have already been carried out in the Recôncavo and São Francisco basins, which aimed to obtain initial parameters to carry out the operation in the future eventually.²⁶

4.1 The American Influence on Brazilian Hydraulic Fracturing Regulations

As expressly stated by Technical Note 345, which supports ANP Resolution No. 21/2014, to regulate hydraulic fracturing to exploit unconventional resources, ANP focused on the American model²⁷. In the United States, differently from Brazil and due to its federative model, the regulation of the exploitation of unconventional resources through hydraulic fracturing occurred, eminently, in the regional sphere, that is, within the scope of the Federated States.

In that regard, at the subnational level, Araújo (2016) showed synergies between Brazilian and American regulation:

²¹ Insertion of items II and III in Article 6:

Article 6 The Operator shall also publish on its website:

II - Relationship of chemicals, with potential impact on human health and the environment used in the process, transported and stored, contemplating their quantities and compositions;

III - Specific information about the water used in fractures, clearly nominating origin, volume captured, type of treatment adopted, and final disposal;

²² The example of Insertion of art. 11 item I:

Art. 11. The Coating and Cementing Program should consider the following aspects:

I - Critical cementing parameters such as paste density, hardening time, fluid loss control, bottom pressures during pumping, and development of compressive strength should be reported;

²³ The Insertion of item XXIV in art. 1 and Art. 17:

XXIV - Step-Rate Test-Test performed prior to the hydraulic fracturing operation in which a fluid is injected for a defined period, in sequences of increasing pumping rates. The result is used to identify parameters of the fracturing operation, such as pressure and flow required for a successful operation.

Art. 17. The Operator, prior to the Hydraulic Fracturing operation in an Unconventional Reservoir, shall perform tests from which the pressures required for the start, propagation, and closure of fractures are obtained, such as injectivity tests, microfractures, and step rate tests, comparing the resulting values with those foreseen in the fracturing project and redoing the modeling and simulations, if so.

²⁴ Such as the Insertion of item VI in Art. 8:

Art. 8º The approval of Hydraulic Fracturing in Unconventional Reservoir by the ANP will depend on the presentation by the Operator, at least 60 (sixty) days before the beginning of the drilling, of the following documents:

VI - Studies and evaluation of natural and induced seismic occurrences.

²⁵ The Federal Attorney's Office analyzed Technical Note 74 through Opinion No. 196/2014/PF-ANP/PGF/AGU and requested that the Superintendence of Operational Safety and Environment express itself on what it meant by: "the modifications made were motivated by the suggestions of the consultation and public hearing, whose total or partial acceptance led to possible adjustments in other points of the text, who, in general, did not bring material changes that extrapolated the suggestions received and their logical reflexes." The SSM highlighted that there was no material change and, through Technical Note No. 135/SSM/2014, it brought what adjustments were made.

²⁶ The acuity of the answer to the question depended on the exact definition of Hydraulic Fracturing in an unconventional reservoir. This concept is now defined in ANP Resolution No. 21/2014 of April 10, 2014, as a *pressurized fluid injection technique in the well, in volumes above 3,000m3, in order to create fractures in a given formation whose permeability is more minor than 0.1mD (mili Darcy), enabling the recovery of hydrocarbons contained in this formation*.

Considering these parameters, it can be stated that No there are records of Hydraulic Fracturing in non-conventional reservoirs in Brazil. Similarly, to date, there has been no request, nor has authorization been given by the ANP to perform Hydraulic Fracturing in a non-conventional reservoir

²⁷ "However, there are reports of contamination and other problems in the areas where hydraulic fracturing activities are being carried out, especially in the USA. These cases served as a reference for Resolution elaboration, the extent to which they were allowed to identify the causes and mitigating measures of the reported damages to contemplate them in the regulation. [...] The regulations suggested here sought international references both in research and development and regulation. On this knowledge base, the philosophy used in the operational safety and environment of the ANP was applied.

As a result, the proposed regulation maintained the profile of requirements for risk management, requiring Operators to perform activities within the best practices of the Oil and Natural Gas Industry and based on performance and continuous improvement." (ANP, 2012) (griffin).

Table 2 - Comparison of Brazilian and American Regulations on Hydraulic Fracturing in Unconventional Resources.

	Texas	Pennsylvania	Colorado	Brazil
Restrictions on indentation for the water bodies	-	<u>300-1000 feet</u> <u>(91.44 m - 304.8 m), depending on the of the water body</u>	Designates only water sources. It may vary.	<u>200 m</u>
Report for pre-drilling water bodies	-	Responsibility Legislation	<u>0.5 mile</u> <u>(804.67 m)</u>	<u>1000 m horizontal</u>
Depth of the coating and cementing	<u>Performance-based regulation</u>	50 feet below the aquifer (15.24 m)	50 feet below of the aquifer (15.24 m)	<u>Performance-based regulation</u>
Restrictions on water capture	<u>Requires Authorization</u>	<u>Requires Authorization</u>	<u>Requires authorization</u>	<u>Requires Authorization</u>
Disclosure of information on the fluid of F.H.	<u>Disclosure Required</u>	<u>Disclosure Required</u>	<u>Disclosure Required</u>	<u>Disclosure Required</u>
Storage options of fluid	Lagoons of containment allowed and Regulated for all Fluids	Lagoons of containment allowed and Regulated for all Fluids	Lagoons of containment allowed and Regulated for all Fluids	Information should be contained in the "System of Management Environmental"
Options for disposal of Waste	They range from according to the type of residue.	They range from according to the type of residue.	They range from according to the type of residue.	"System of Management Environmental"
Communication from Accidents	<u>Immediate</u>	2 hours after Discovery	24 hours after Discovery	<u>Immediate</u>
Rates Environmental	Variables - Programs incentive	"Rate of impact"	From 2% to 5% gross value of the extracted gas	Nothing appears in Resolution ANP 21/2014

Source: adapted from Araújo (2016).

Table 2 shows elements in common in the American and Brazilian regulations. The states elucidated above served as a reference for the Brazilian regulator and also Oklahoma legislation.

In Oklahoma, the *Oklahoma Corporation Commission* exercises jurisdiction over oil and gas. Since 2013, the OCC has been editing rules on hydraulic fracturing, which can be found in the *Oklahoma Administrative Code* (OAC) in Title 165, Chapter 10, which deals with oil and natural gas conservation²⁸. In this chapter, it is also possible to observe the influence of the regulation of this American State on Brazilian legislation, regarding:

1. disclosure of information on hydraulic fracturing fluid has been identified²⁹.
2. protection of water resources in the process of completion of the well, demanding authorization for its realization.³⁰

²⁸ Chapter 10 of the Oklahoma Administration Code is available at: <<https://bit.ly/3viYdtw>>.

²⁹"165:10-3-10. Well completion operations

Chemical disclosure. Within 60 days after the conclusion of hydraulic fracturing operations on oil, gas, injection, disposal, or service well that is hydraulically fractured, the operator must submit information on the chemicals used in the hydraulic fracturing operation to the FracFocus Chemical Disclosure Registry."

³⁰ "165:10-3-10. Well completion operations

3. rules on limit distance for waste disposal, among others.³¹

The consideration of the North American model enriched the ability to glimpse possible risks by the Brazilian regulator because, in the states mentioned above, negative externalities of the use of hydraulic fracturing were verified, such as the State of Oklahoma. According to the U.S. Geological Survey, Holland (2011) indicates that after beginning the technique use in the State, the number of seismic shocks multiplied by 10. Despite the studies indicating that the increase in the system of seismicity did not result from hydraulic fracturing itself but the process of wastewater elimination, the OAC proposed constant monitoring of critical parameters in terms of seismicity³² (OAC, 2013). In addition, to address the risks related to wells already opened, the Granting Authority has given the OCC the power to act in emergencies in oil and natural gas fields. Thus, OCC acted by requesting well operators to reduce by 40% the amount of waste injected into waste wells (Vinson; Elkins: 2020), which involved more than 600 wells in operation.

Although the Brazilian consideration of the history of other countries when regulating hydraulic fracturing in non-conventional resources, it is necessary to consider that, in the case of the USA, the use of this technique is older and more *discussed among the stakeholders involved* (ANP, 2013). By structuring the standard based on American best practices, ANP tries to mitigate current risks in the activity. However, it ignored that the course of time between the beginning of the exploration of the activity and its use in a sprawling way was broad in that country, which allowed the accumulation of experiences, learning, institutional support, and, more importantly, information on existing non-conventional resources (Bomberg, 2013; Scotchman, 2016).

5. Formal and Material Considerations on the Administrative Processes Analyzed

First, it is relevant to consider the rite undertaken in the context of the two administrative procedures in reference. This aspect is essential because non-compliance would cause formal irregularity processes. Contact with the public allows the

(a) Hydraulic fracturing and acidizing. In the completion of an oil, gas, injection, disposal, or service well, where acidizing or fracture processes are used, no oil, gas, or deleterious substances shall be permitted to pollute any surface or subsurface freshwater. Unless an operator confers with and obtains the approval of the Conservation Division, the use of diesel fuel as the base fluid for hydraulic fracturing operations is prohibited. Approval of the Conservation Division shall be reflected in writing. Within 5 days of obtaining written authorization, the operator is required to send the authorization by facsimile, electronic mail, or regular mail to the following:

(1) The owner of the surface location where the proposed well is to be drilled; And

(2) Each operator of a producing spacing unit or well within 1 mile of the perforated interval of the proposed well".

31 (i) Conditions of permit. Any discharge of produced water done under this Section shall be subject to the following conditions or stipulations of the permit.

(1) Presence of representative. A representative of the operator shall be on the discharge site at all times that water is being applied. The appropriate Conservation Division District Office may grant a variance from this provision for justifiable cause. A written request and supporting documentation shall be required. The appropriate Conservation Division District Office shall respond in writing within five business days after receipt, either approving or disapproving the request.

(2) Weather restrictions. Surface discharge shall not be done:

(A) During precipitation events or when precipitation is imminent.

(B) When the soil moisture content is at a level such that the soil would not readily take the addition of water.

(C) When the ground is frozen.

(D) By spray irrigation, when the wind velocity is such that even distribution of water cannot be accomplished or the buffer zones, t t to (3) of this subsection, cannot be maintained.

(3) Buffer zones. Surface discharge shall not be done within the following buffer zones:

(A) Fifty feet of a property line boundary.

(B) Fifty feet of any stream not designated by Oklahoma Water Quality Standards.

(C) Three hundred feet of any actively-producing water well used for domestic or irrigation purposes.

(D) Eight hundred feet of any public water well.

32 (5) Requested monitoring and reporting within areas of interest regarding seismicity or potentially critical environmental or public safety impacts. Upon request by the Manager of the Induced Seismicity Department, the following actions must be performed and the information provided to the Manager of the Induced Seismicity Department

(A) Operators shall monitor on a daily basis volumes and pressures for wells authorized for disposal within areas of interest designated by the Oil and Gas Conservation Division seismic regarding or potentially critical environmental or public safety impacts. The information shall be submitted on Form 1012D at a minimum on a weekly basis or as designated by the Manager of the Induced Seismicity Department.

(B) Operators of wells authorized for disposal within areas of interest designated by the Oil and Gas Conservation Division regarding seismicity or potentially critical environmental or public safety impacts shall supply bottom hole pressure data using a method approved by the Manager of the Induced Seismicity Department.

(6) All UIC wells. Information regarding disposal wells, injection wells, and storage wells shall be reported on Form 1012 or Form 1012C individually according to the order or permit authorizing disposal

sanitation of issues unknown by the public authorities, reducing insecurity since a further challenge is reduced if all interested parties participate in the discussions.

In this respect, it is relevant to consider the supervenience of Law No. 13,848/2019 (Regulatory Agencies Act), which brings explicit provisions "OF THE DECISION-MAKING PROCESS OF REGULATORY AGENCIES." This law proposes that: i) the Regulatory Impact Analysis should precede changes in normative acts of general interest of economic agents, consumers, or users of services provided³³; ii) Public Hearings should be convened for matters considered relevant by the collegiate decision³⁴; and iii) public consultations will precede decision-making by the collegiate board on proposals to change norms of general interest to economic agents, consumers or users of services, and, as a rule, will last 45 days, except exceptional cases of relevance and urgency³⁵ (Brazil, 2019). The positive effects of these instruments of transparency, publicity, and access to the decision-making demonstrate the importance of these requirements for the good normative elaboration of agencies.

With the new law, the rules regarding hearings and public consultations that regulators must follow are evidenced. However, before the legal provision entry into force, there were already rules regarding PA and CP in the ANP. They were: i) Resolution No. 5/2004, which brings procedures on public hearings; ii) Normative Instruction No. 8/2004, which provides procedures on public consultations.

Despite complaints regarding little representation; little publicity of the call; and occurrence only in the city of Rio de Janeiro, there was no formal irregularity in the two public hearings since the ten days of the publication of the notice for its occurrence was respected, as provided for in Resolution 5/2004. However, it should be acknowledged that it would be desirable that these hearings could have taken place in other locations, especially concerning the 12th Round, so that the region's agents under exploitation could manifest themselves. However, it urges to point out that the non-occurrence of PA in other locations, other than the ANP's head, is an aspect that did not hurt the current norm at the time, nor would it meet the provisions of the agencies' law.³⁶³⁷

About public consultations, it is verified that there is a 30-day deadline recommendation in Normative Instruction No. 8/2004 that was not followed in Administrative Process 48610.003442/2013, which dealt with the 12th Bidding Round. However, this reduction in time does not mean an irregularity because the standard allows a shorter term to be established upon approval by the Collegiate Board, which happened in the present case. In any case, due to the sensitivity of the theme, it was recommended that the 30 days had been followed.³⁸

³³ Art. 6 ° The adoption and proposals to amend normative acts of general interest of economic agents, consumers, or users of the services provided will, following the regulations, be preceded by the conduct of Regulatory Impact Analysis (AIR), which will contain information and data on the possible effects of the normative act. (Regulation)

³⁴ Art. 10. The regulatory Agency, by collegiate decision, may convene a public hearing for the formation of judgment and decision-making on matters considered relevant.

³⁵ Article 9 ° The drafts and proposals to amend normative acts of general interest of economic agents, consumers, or users of the services provided shall be the subject of public consultation prior to decision-making by the board or the collegiate board.

§ 2 - With the matter of a requirement for a different period in specific legislation, agreement, or international treaty, the period of public consultation shall begin after the publication of the respective order or notice of opening in the Official Gazette and on the Agency's website. It shall have a minimum duration of 45 (forty-five) days, unless an exceptional case of urgency and relevance, adequately motivated.

³⁶ "First, to say that it is absurd this process as it is happening, discussing hydraulic fracturing regulations in Brazil. At first, an ANP representative said the Agency is listening to society. It is not possible that the Agency wants to listen to the entire Brazilian society in a "room" like this, in Rio de Janeiro, in a super poorly publicized audience, because I am sorry, but disclose only on the site, for an auction that will take place in a week, including seven basins in Brazil, including several areas, with various indigenous peoples, indigenous peoples in isolation. I am sorry, but this is not 'discuss with Brazilian society'; it is far from discussing."

³⁷ Article 4 Shall be included in the notice of communication of the public hearing the date, place, time of realization, its objective, the form of registration and participation, the programming, and, as the case may be, the opening of public consultation.

Single paragraph. The notice of public hearing will be published in the Official Gazette - DOU at least 10 (ten) days in advance, unless the public consultation makes it necessary for a more extended period.

³⁸ "5.1.1.3.3 The term of the Public Consultation should preferably be 30 (thirty) days, with approval from the Collegiate Board of Directors in the case of a lower term."

From all the above, it was verified that there was no formal bias about transparency, publicity, and social participation procedures. However, in the specific case, the follow-up of the procedure did not prevent subsequent demands for cessation of activity because it should be considered that the normative commandments impose minimum criteria. It is up to the public administration to verify the complexity of the issue, to understand whether it is appropriate to increase the accuracy of the procedures.

In the case under discussion and considering the interaction after the hearings and public consultations that occurred in the Judiciary, it seems feasible that the ANP will take broader rites in terms of time and territorial coverage for discussion when returning to address the subject.

In this sense, it is recommended that in the future, when discussing the use of hydraulic fracturing for the exploitation of unconventional resources again, the Agency proposes Public Hearings: (i) in the regions where there will be explored; and (ii) through digital platforms that overcome geographical barriers, ensuring greater participation of stakeholders throughout the country.

Another relevant aspect is to observe that the ANP opted, above all, for the express provision of the CNPE in Resolution No. 6/2013, to first bid blocks with potential unconventional reservoirs for exploitation of the resource through hydraulic fracturing and later regulate the technique. Therefore, it is found that the Agency has adopted a contract regulation approach, which is an alternative compatible with current legislation and would not have been by itself illegal under the agreed terms³⁹

Moreover, as is evident throughout the Administrative Process 48610.010646/2013, hydraulic fracturing in Brazil is not a new technique. The originality is its use to obtain unconventional resources. In addition to the above, the terms of the Federal Constitution reinforce that the absence of a specific resolution would not make the operation unfeasible because the free enterprise is at the same time the foundation of the Republic and guiding principle of the economic order. It means that regulate an activity via contract is possible under Brazilian legal system. In other words: if an activity is not expressly fenced by law, it is possible to exercise, as well exposed by Federal Prosecutor Olavo Bentes David at Public Hearing No. 30/2013⁴⁰:

In this perspective, it has the right to do the exploration and, eventually, the production at any geological level that it finally understands that it is worth investing that resource and that, eventually, discovers oil. So, for example, San Francisco Basin. It is even a question here that I am going to, in a way, advance: San Francisco Basin, is there being unconventional resource exploitation? Yes, it is. For the good of the miners. If the gas is discovered there, under commercial conditions, gas has already been discovered, under commercial conditions, will have a source of this resource, of this precious resource near the market that craves natural gas. There, you're being... Was unconventional hydraulic fracturing done in the country? It was done in a very timid way yet. Was. Based on what Resolution? No. No Resolution. Why? Because if you, the basic principle of law is the principle of legality, it is a constitutional principle. If there is no law that sees a particular action of the individual, he cannot be resonated from not engaging in that activity. So why the importance of the Resolution? Now, coming back here. It is precisely the Resolution that will bring the standards, which will bring the limits that will bring the methodology and unconventional fracturing. Both for the areas that will be bid, not only of the 12th Round but of the future rounds and the areas that have already been bid. That is the importance that we have here in our Resolution. (griffin)

³⁹ "It is worth saying, while in the regulation by contract has the primary regulatory function, through essential regulatory choices made by the political person holder of the infrastructure pre-established and determined in the regulatory contract (public choices contractualized), by the consensus between the regulator and regulated, in the regulation by agency, which complements and has an integrative function with the regulation of the political environment, the secondary regulatory function is the secondary regulatory function, limiting and conforming to the execution of regulatory contracts based on the long duration, with the possibility, including, of the participation of citizens and economic agents in the exercise of regulatory activity through public hearings and consultations." (VALIATI: 2019. p. 46-47).

⁴⁰ Art. 1º The Federative Republic of Brazil, formed by the indissoluble union of states and municipalities and the Federal District, constitutes the Democratic State of Law and has as its foundations:
IV - the social values of work and free enterprise;
Art. 170. The economic order, founded on the valorization of human work and free initiative, aims to assure everyone a dignified existence, according to the dictates of social justice, observed the following principles:

Therefore, it was unnecessary to regulate hydraulic fracturing to enable its use in conventional resources and preliminary steps in unconventional resources. This alone shows that it is not the structuring of regulation that is the main barrier to the exercise of the activity, and this is corroborated by the judicial decisions, which, after ANP Resolution No. 21/2014, do not indicate vice or gaps in this standard.

This point is crucial because it demonstrates that, even though free enterprise is one of the norths of the economic order, the defense of the environment as relevant as this principal in Brazilian legal system. The counterbalance between these principles led to the discussions held in the context of the 12th Round. As anticipated in section 2.1, the discussions' result was not to prohibit the exercise of the activity but to impose constraints on its occurrence. The procedural analysis shows that it is not due to the public and contractual terms exposed that the agents are opposed to exploiting unconventional resources. There was not even a significant expression of dissatisfaction with the absence of specific rules at the time of bidding. The discontent exposed in the discussions, including in the context of drafting Resolution No. 21/2014, is due to the amount of information considered insufficient on the conditions of the reservoirs where the resources would be found. That is: society was not satisfied by the incipience of the data presented⁴¹.

Therefore, it will not be the regulation of the theme, even if very detailed, that will remove the legal uncertainty of the exercise of these activities and possible risk of judicialization because the interested parties are not convinced that it is safe to operate in unconventional reservoirs. It will be necessary to present the information prior to the exploration, which, as stated in the judicial decisions, would be:

- i) Environmental Assessment of Sedimentary Area – AAAS, provided for in Interministerial Ordinance No. 198, of 04/05/2012 of the Ministry of Mines and Energy; and
- ii) prior regulation of the National Council for the Environment (CONAMA).

In its manifestations, ANP explained that the AAAS is not an adequate instrument for presenting the information craved by the agents. ANP went further, clarifying that the issue is sensitive since to obtain the necessary information about the risk (such as the seismicity), it is necessary to effectively perforate and analyze the conditions⁴² *associated with the well*. It seems feasible to understand that, despite a possible misunderstanding about the appropriate instrument, what the agents involved in the administrative and judicial discussions claimed for denser and more precise information about the geological and environmental conditions of the regions subject to exploitation, and their closest involvement in the exercise of the activity.

Hence, it is possible to believe that the pilot project initiative for the exploration of unconventional resources called "Transparent Well in a reservoir of the low permeability of Oil and Natural Gas" ("Transparent Well Project") will be an effective means of enabling this type of activity. This initiative aims to:

41 Art. 170. VI - protection of the environment, including through differentiated treatment according to the environmental impact of products and services and their processes of elaboration and delivery; (Wording given by Constitutional Amendment No. 42 of 12.19.2003)

42 "The AAAS, defined in Interministerial Ordinance No. 198/2012, focuses on the regional impact assessment, based on several possible scenarios for the activity of exploration and production of oil and natural gas. The evaluation aims to classify areas as "apt," "not able," or even those that should be kept in "moratorium" due to the need for more detailed studies or even the definition of more accurate mitigation mechanisms. It is not difficult to realize that the specific issue of unconventional resources does not fall as the object of "strategic evaluations." AAAS could be useful for analyzing water availability in a given basin and its distribution for competing uses, something that can be solved, when applicable, by granting water by Basin Committees. The potential impacts of fracturing are related to the "project," i.e., position and extent of the generating rock, distance from the generator to the base of the aquifer, monitoring of water wells and neighboring aquifers, etc.

The GTPEG's consideration that the Environmental Assessment of Sedimentary Area, "due to its characteristic of broad public participation, should be used for the further study of the specific conditions of a given basin to support the exploitation of unconventional gas in an environmentally safe manner" is mistaken. The environmental safety of hydraulic fracturing is determined by the control of local geological situations, not homogeneous along the basins, and the position of aquifers, also not necessarily uniform distribution. It makes no sense to invoke an inappropriate instrument for the proposed purpose only because it has a distinctive element, with the ordinary rite of licensing, a public consultation of its Terms of Reference.

It is clear that the resolution proposed by the ANP and the corresponding environmental licensing for the drilling and fracturing stage is the essential and sufficient elements for ensuring operational and environmental safety."

[...] give credibility and sustainability to the process, through the expansion of knowledge about hydraulic fracturing techniques and extensive dissemination of information (geological, environmental, and technical) on the progress of exploration projects and production of unconventional natural gas through this technology.⁴³

The Transparent Well Project, which takes place under the Program for the Revitalization of Activities for the Exploration and Production of Oil and Natural Gas in Terrestrial Areas (REATE)⁴⁴, is an initiative created to provide transparency and improve knowledge regarding the exploitation of unconventional resources, also for the use of hydraulic fracturing (EPE, 2018). The proposal is to drill a well, which will serve as a pilot project, where the hydraulic fracturing technique will be used (EPE, 2018). From this operation, comprehensive step-by-step documentation will be carried out so that it is possible to share with the public the knowledge about the project, publicizing the results of the initiative (Delgado, 2018).

Therefore, the project seeks to act directly at the point discussed in the administrative and judicial processes already mentioned, filling the gap for environmental and geological information demanded by society regarding this type of activity and allowing the direct involvement of these agents, as explained by Delgado (2018):

As seen in the above-mentioned international examples, the granularity of the information resulting from the monitoring of air quality, water, seismic activities, the infrastructure and logistics of the project, and the adjacent socioeconomic issues, allow a wide sample of data to understand how the activity in this specific play will work in the Brazilian specificities. In addition, the interactivity for real-time monitoring of well activities, easily accessible and transparent to the community, and the use of clear and direct language is important for the development of the activity in the country. (griffin)

Given the above and given that the main social and judicial obstacle to the implementation of the exploitation of unconventional reservoirs via hydraulic fracturing is the lack of information, the pilot of "Transparent Well Project" is an appropriate means for the purpose of enabling the exploitation of unconventional resources in Brazil. It would help to obtain information that confirms that it is possible to mitigate the risks associated with the activity, so that its benefits outweigh the burdens.

6. Final Considerations

After the analysis previously exposed, the lack of transparency and popular participation in the administrative processes to discuss hydraulic fracking was not the reason for the not development of the activity. The evidence from the arguments that prospered in the legal suits shows that these formal arguments were not the central point of the discussion.

Secondly, the absence of a specific resolution was not even a factor for social dissatisfaction during the discussions. It is possible that the regulation by contract – despite the high risk associated with the activity – could be adequately used in the present case.

Nevertheless, it is possible to argue that when dealing again with the issue, ANP could be more rigorous in implementing transparency instruments. Also, the Agency could promote public hearings virtually and in person, not only in Rio de Janeiro. It would also be beneficial for the Agency to develop RIA to address all aspects involved in implementing the activity, addressing the positive and negative points of the exploitation of unconventional resources exhaustively.

Despite the possibilities of improvement of procedural instruments, the central aspect of the discussions was the lack of

⁴³ PPI. Available in: <https://www.ppi.gov.br/apoio-ao-licenciamento-ambiental-da-execucao-do-projeto-poco-transparente-em-reservatorio-de-baixa-permeabilidade>. Access on May 23. 2021.

⁴⁴ The REATE was instituted by the MME Ordinance 17, 2018.

information (considered unsatisfactory) about the blocks presented in the 12th Round in environmental and geological matters. In the context of judicial proceedings, two conditions have been established that must be fulfilled – unless there is a new court decision in a different sense – for the use of hydraulic fracturing in unconventional resources, which are the regulation by CONAMA and the preparation of AAAS. In this sense, the Transparent Well Project can be a public policy capable of addressing the information gaps pointed out by society and finally enabling hydraulic fracturing in unconventional resources in Brazil.

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