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MINERAL WATER: AN APPROACH TO MINING, COLLECTION AND QUALITY FOR HUMAN CONSUMPTION AND HEALTH PROMOTION

ÁGUA MINERAL: UMA ABORDAGEM À MINERAÇÃO, ARRECADAÇÃO E QUALIDADE PARA O CONSUMO HUMANO E PROMOÇÃO DE SAÚDE

AGUA MINERAL: UNA APROXIMACIÓN A LA MINERÍA, CAPTACIÓN Y CALIDAD PARA EL CONSUMO HUMANO Y LA PROMOCIÓN DE LA SALUD

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SUMMARY

The present study demonstrates aspects of mineral water research and mining. It was intended to demonstrate the guidelines of the Mining Code and the Water Code, as legal guiding bases under the management of the National Mining Agency and to analyze the importance of controlling the quality of water for human consumption, according to Anvisa Resolutions - RDC- 274 and 275/2005. The process of making water available as a mineral good to be industrialized goes through research, analysis, classification and mining. In this context, its guiding question is: what is the importance of the quality of mineral water for human consumption in promoting health? And it aims to analyze the quality of water, its importance for consumption and health promotion. It also demonstrates that the National Mining Agency monitors the commercialization of mineral waters through the inspection of the collection of the Financial Compensation for the Exploration of Mineral Resources - CFEM. For this, a bibliographic research was carried out, consulting legislation, books and websites of public agencies. The results showed that mineral water mining is an activity present in the daily life of society and its regular consumption enables a healthy quality of life. Mineral water has been shown to bring important health benefits: in body thermoregulation, transport of nutrients, oxygen, urine formation, skin dryness, cell revitalization, aggravated by low water consumption. Its medicinal properties of secular knowledge and use also help human health, especially waters rich in sulfur, radioactive, magnesium, etc., can help in therapeutic treatments.

KEYWORDS: Mines. Mineral waters. Human consumption. Mining code. Collection.

RESUMO

O presente estudo demonstra aspectos da investigação da água mineral e da exploração mineira. Destinou-se a demonstrar as orientações do Código Mineiro e do Código da Água, como bases orientadoras legais sob a gestão da Agência Nacional de Minas e a analisar a importância do controle da qualidade da água para consumo humano, de acordo com as Resoluções Anvisa - RDC- 274 e 275/2005. O processo de disponibilização da água como bem mineral a ser industrializado passa pela investigação, análise, classificação e exploração mineira. Neste contexto, a sua pergunta orientadora é: qual é a importância da qualidade da água mineral para o consumo humano na promoção da saúde? E visa analisar a qualidade da água, a sua importância para o consumo e para a promoção da saúde. Demonstra também que a Agência Nacional de Minas controla a comercialização de águas minerais através da inspeção, da recolha e da Compensação Financeira pela Exploração de Recursos Minerais - CFEM. Para tal, foi realizada uma pesquisa bibliográfica, consultando legislação, livros e *websites* de organismos públicos. Os resultados mostraram que a exploração de águas minerais é uma atividade presente na vida cotidiana da sociedade e o seu consumo regular permite uma qualidade de vida saudável. A água mineral demonstrou trazer importantes benefícios para a saúde: na termoregulação corporal, transporte de nutrientes, oxigênio, formação de urina, secura da pele, revitalização celular, agravada pelo baixo consumo de água. As suas propriedades medicinais de conhecimento e utilização secular também ajudam a saúde

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humana, especialmente as águas ricas em enxofre, radioativas, com magnésio etc., podem ajudar nos tratamentos terapêuticos.

PALAVRAS-CHAVE: Minas. Águas minerais. Consumo humano. Código mineiro. Recolha.

RESUMEN

El presente estudio muestra aspectos de la investigación y la extracción de agua mineral. Se pretendió demostrar las directrices del Código de Minería y del Código de Aguas, como bases legales orientadoras bajo la gestión de la Agencia Nacional de Minería y analizar la importancia del control de la calidad del agua para consumo humano, según las Resoluciones de la Anvisa - RDC- 274 y 275/2005. En este contexto, su pregunta rectora es: ¿cuál es la importancia de la calidad del agua mineral para el consumo humano en la promoción de la salud? Y pretende analizar la calidad del agua, su importancia para el consumo y para la promoción de la salud. Para ello, se realizó una investigación bibliográfica, consultando legislación, libros y páginas web de organismos públicos. Los resultados mostraron que la explotación del agua mineral es una actividad presente en la vida cotidiana de la sociedad y su consumo regular permite una calidad de vida saludable. Se ha demostrado que el agua mineral aporta importantes beneficios para la salud: en la termorregulación del cuerpo, el transporte de nutrientes, el oxígeno, la formación de orina, la sequedad de la piel, la revitalización celular, agravada por el bajo consumo de agua. Sus propiedades medicinales de conocimiento y uso secular también ayudan a la salud humana, especialmente las aguas ricas en azufre, radiactivas, con magnesio, etc., pueden ayudar en los tratamientos terapéuticos.

PALABRAS CLAVE: Minas. Aguas minerales. Consumo humano. Código minero. Colección.

1. INTRODUCTION

We can say that mineral waters are particular cases of groundwater, since this is their common origin, having a direct relationship with the hydrological cycle. By penetrating the interior of the subsoil in both rocky and/or soil environments, through which it passes, through the time of percolation, and depending on the depth, the waters are enriched in some constituents, determining their chemical and physicochemical composition, which give them characteristics (CPRM, 2021).

According to Feitosa (2008), the hydrological cycle represents the water path from the atmosphere through the phases of precipitation, infiltration, underground runoff, surface runoff, evaporation and evapotranspiration. The cycle starts from the condensation of water vapor in the atmosphere forming clouds that fall like rain. In the soil, part of the precipitated volume is intercepted by the plants, while another part infiltrates into the subsurface, promoting soil rehydration and recharge of the groundwater reserves. The non-infiltrated excess generates the surface runoff that feeds the streams, rivers and lakes.

According to Frtzen and Binda (2011),

the hydrological cycle is not a simple sequence of processes, but a set of phases that represent the different paths through which water must circulate in nature.

Arana (2204), describes the Hydrological Cycle as a continuous process of transport of water masses from the oceans to the atmosphere through the phenomena of evaporation, precipitation,



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transpiration, flow through gravitational action, infiltration, etc. Uninfiltrated excess generates surface runoff that feeds streams, rivers and lakes.

Serra (2009, p. 44) assesses that:

The chemical composition of rocks, through which groundwater infiltrates, is responsible for its mineralization. The rainwater penetrates the ground and crosses several layers of rocks until it stops. In this path below the ground, the water passes through rocks with mineral substances, such as calcium carbonate and sulfate, which are diluted in the water, enriching it and thus acquiring medicinal properties. Other important factors are temperature and pressure, which help determine the characteristics of water. Mineral waters are divided into weak, medium and strong.

Mineral water can arise under the surface in specific locations, in springs or natural sources, underground environments of mines where prospecting is required for the discovery of stationary mineral waters or artificial sources from which they are captured. Mineral water has a differentiated chemical composition from common waters, since it is formed by chemical elements that determine the characteristic of drug action (SERRA, 2009).

Gorini (2000), analyzes that there are two theories that seek to explain the origin of mineral waters, which present controversies: the first, of meteoric origin, where scholars consider the origin from infiltration of rainwater in places of great depth; the second theory considers that mineral waters are of magmatic origin, where part of the mineral waters are the result of phenomena such as volcanism.

Water is regulated by Brazilian states, especially those of underground origin, which in order to be captured require a grant instrument, according to the relevant state legislation. Mineral water is classified as ore and is submitted to the National Mining Agency – ANM¹ therefore, it is under the rules of the Mineral Water Code (ANM, 2021).

Thus, according to art. 38, chapter X of this code, mineral waters to meet commercial issues, are analyzed and reanalyzed in a classificatory way at the request of the National Mining Agency-ANM and carried out by the Mineral Analysis Laboratory-Lamin/CPRM, for identification through an on-site study and laboratory tests of the chemical components that compose the soluble residue and characterization of the physical and physical-chemical properties inherent to the sources, in periods of up to three years (ANM, 2021).

The present study aims to evaluate the research and mining in mineral water mining, in compliance with the Mining Code and Water Code, in the control of exploration of mineral water mines; to analyze the importance of mineral water quality control for health promotion, in accordance with Anvisa Resolutions – RDC 274/2005 and RDC 275/2005.

In this context, it has as a guide question: What is the importance of mineral water quality for human consumption and health promotion?

1 - The National Mining Agency (Agência Nacional de Mineração) – ANM was created on July 25, 2017 by Provisional Measure No. 791. With source headquarters in Brasília, the agency is directly linked to the Ministry of Mines and of Energy and has patrimonial and administrative autonomy.



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To answer this question, we chose to conduct a bibliographical research on the subject, with the purpose of contributing information and hypotheses.

The choice of the theme is justified based on the assumption that the Mineral Waters Code, Decree-Law No. 7,841/1945, Decree-Law No. 9,406/2018, which regulated Decree-Law No. 227/1967 and ANVISA Technical Regulations – RDC 274/2005, for filler and RDC 275/2005, for microbiological characteristics, brought regulations in the management of the commercial use of mineral water sources that can be sent to a single and exclusive context, in the case of mineral waters with quality assurance for human consumption and health promotion.

It should also be noted that the National Mining Agency - ANM, manages and regulates the Brazilian mineral heritage and exercises control over the collection of the Financial Compensation for the Exploration of Mineral Resources - CFEM, according to specific legislation, Law 8.001/1990, amended by Law 13,540/2017, which provides for the transfer of this royalty to municipalities, states and the Union, in percentages pre-established in said law, favoring with a higher percentage those with less economic power, precisely because it is in the municipality where the greatest environmental damage occurs. and the Union that redistributes its rate among the technological entities involved.

The social and academic relevance of the study and groundwater protection measures and the improvement of the framework of mining areas representing the conditions of access to quality mineral water for the promotion of the population's health.

2. NATIONAL POLICY ON WATER RESOURCES AND WATER MANAGEMENT, FOCUSING ON MINERAL WATER AND THE MINING CODE.

For several decades the commercialization of mineral water has been a reference, from bottled water, whose market has been expressly growing in the last three decades. Thus, the use of industrialized waters has important significance in the context of society, considering that the advances in communication have provided greater interaction of people, who every day have shown greater interest in the acquisition of healthier foods and among them, is industrialized mineral water, by the affordable availability and food security that the product presents, considering technological advances in the operability of processes, increasingly automated and compliance with current standards.

According to Pitaluga (2006), mineral water was the product that in the last thirty years had an exponential growth in consumption among Brazilians, positioning Brazil among the 10 largest consuming countries of mineral water in the world. According to the Brazilian Association of Soft Drinks and Non-Alcoholic Beverages - ABIR, the per capita consumption of the Brazilian mineral water market, evaluated in 2020, was 59.65%, with a growth of 3.9% compared to 2020.

Table 1, which follows the chart below, numerically demonstrates the annual amount in industrial production and the percentage change in consumption year by year.

The per capita consumption of the Brazilian mineral water market has ups and downs throughout the evaluated cycle, 2010 to 2020, showing exceptional growth in some years, even



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opposing industrial growth, having a recovery in 2019 and despite the small advance in the industry from 2019 to 2020, there was no direct relationship in consumption, where there was a drop in consumption from 4.5% to 3.9% in 2020.

Table 1 – Per capita consumption of the Brazilian mineral water Market from 2010 to 2020

Year	Liters/Inhabitant/ Year	Annual Variation (in %)
2010	34,3	N/A
2011	39,2	14,3%
2012	43,4	10,7%
2013	56,6	30,4%
2014	59,6	5,3%
2015	62,8	5,3%
2016	61,54	-2,0%
2017	57,8	-6,0%
2018	55,0	-4,8%
2019	57,4	4,5%
2020	59,65	3,9%

Source: Brazilian Association of Sift Drinks and Non-Alcoholic Beverages – ABIR (2020)

In turn, the production demonstrated over the evaluated period shows a variation in industrialized volume with a slight drop in 2020, with a negative annual variation of 6%, that is, 5.3% in 2019 to 4.7% in 2020.



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Table 2 – Production volume of the Brazilian mineral water Market from 2010 to 2020

Year	Volume (in 1,000 liters)	Annual Variation (in %)
2010	6.543.826	N/A
2011	7.544.286	15,3%
2012	8.423.372	11,7%
2013	11.383.446	35,1%
2014	12.088.245	6,2%
2015	12.836.682	6,2%
2016	12.682.641	-1,2%
2017	11.997.779	-5,4%
2018	11.457.878	-4,5%
2019	12.065.145	5,3%
2020	12.632.207	4,7%

Source: Brazilian Association of Sift Drinks and Non-Alcoholic Beverages – ABIR (2020)

In this context, the commercialization of mineral water remains in the spotlight and has a larger market than other categories of bottled products such as various beverages.

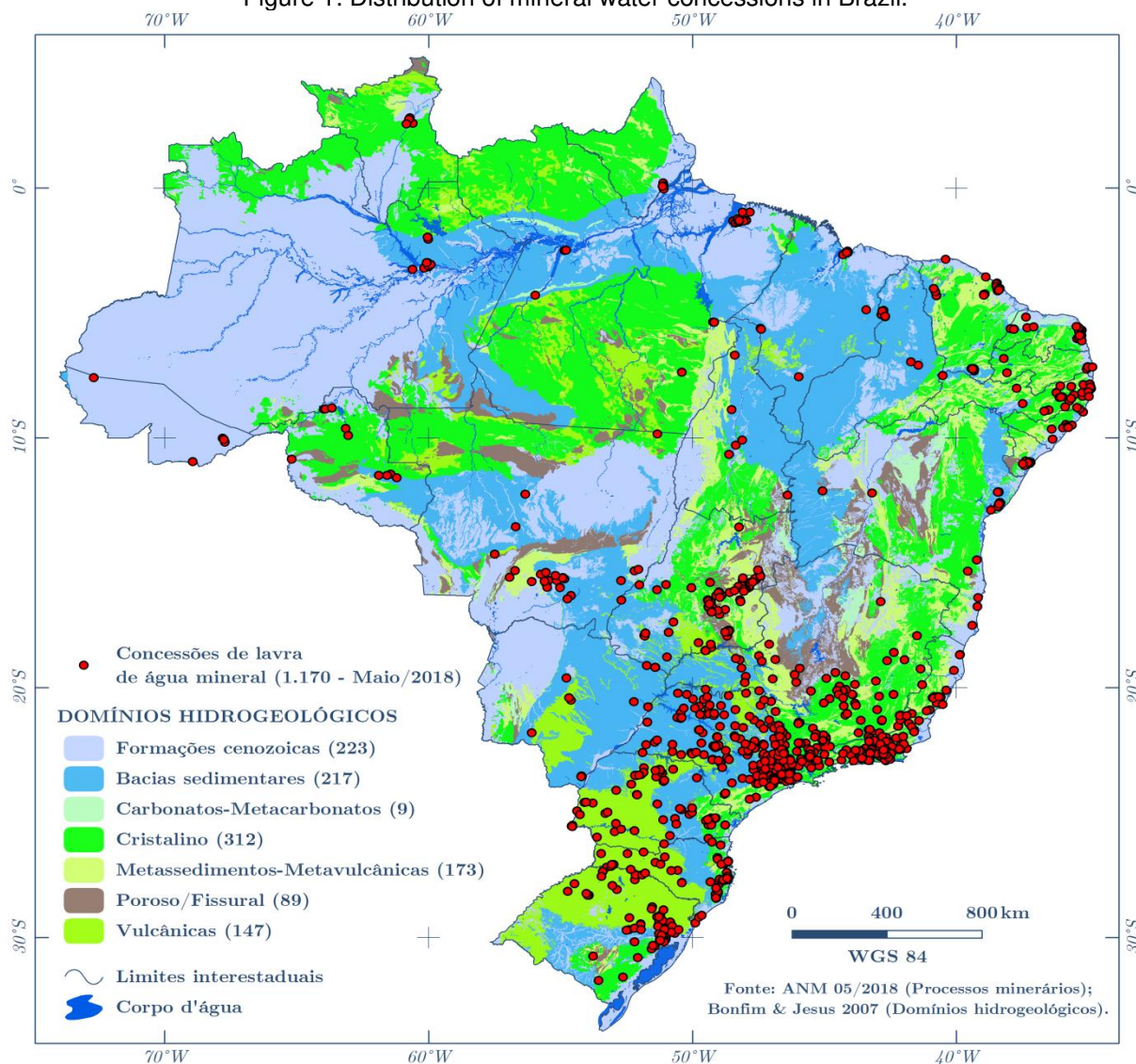
The National Mining Agency - ANM replaced the defunct National Department of Mineral Production – DNPM, in the management and planning of mineral exploration and in the exercise of the activities of companies that exploit mineral waters. So the ANM has the function of regulating the interests of granting underground mines.

In this context, the commercialization of mineral water remains prominent and has a relevant market, growing among other categories of packaged products such as various beverages.

According to Bomfim & Jesus (2007), the hydrogeological domains and the locations of mineral water mining concessions are unevenly distributed in the Brazilian territory.



Figure 1: Distribution of mineral water concessions in Brazil.



Source: Hydrogeological Domains and Mineral Water Mining Concessions in Brazil (ANM data 05/2018, referring to May 2018).

According to Queiroz & Pontes (2015), Brazil had more than a thousand areas of mineral and table drinking water mining, distributed in the five regions of the national territory, and with a variation in the concentration of active concessions in the Southeast region (45%), followed by more or monos balanced the south and northeast regions (17%), central-west region (15%) and North 6%.

It is verified with data from the National Mining Agency ANM from May 2018, that the numbers of mining concessions for each hydrogeological domain totaled 1,170 throughout Brazil. Currently, the number of companies authorized to industrialize and commercialize mineral waters exceeds the total of 1,300 concessions in operation.



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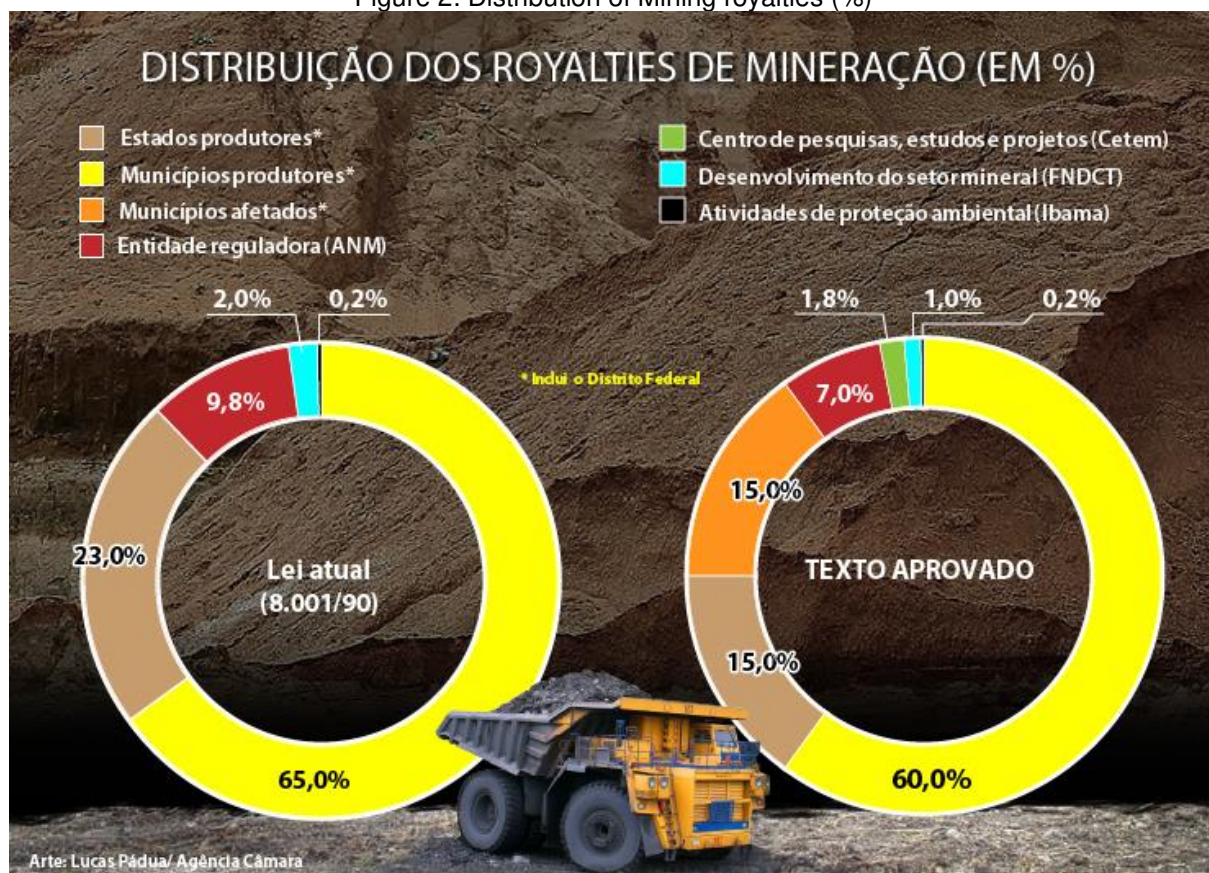
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The Union is based on the exploitation of mineral water, a collection of royalties, through financial compensation - CFEM - Financial Compensation for Mineral Exploration, whose purpose is to transfer to municipalities, States and the Union.

The National Mining Agency - ANM, the Federal Public Agency responsible for the management and regulation of Brazilian mineral heritage, operating from the activities of mining, processing and marketing of mineral products, including monitoring the collection of the royalty called Financial Compensation for Mineral Exploration - CFEM, and transfer of rates destined to other public bodies: the municipality, for reinvestment in the environment, in structural development and in attracting new investments, the Federation Units and the Union, which redistributes its percentage among the ANM itself, IBAMA, CETEM and MCT/FNDCT, being this financial co-participation of great importance for the integration and technological interrelation in the development of the bodies of the administration of the Union, especially in the service to society (ANM, 2022).

The Financial Compensation for Mineral Exploration (CFEM) is collected for the sale of the mineral good at the rates of 3.5%, 3%, 2%, 1.5% and 1%, according to the mineral substance, at a rate of 1 % attributed to mineral water (ANM, 2022).

Figure 2: Distribution of Mining royalties (%)



Source: Agência Câmara de Notícias - ANM (2017).



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The Geological Service of Brazil – CPRM (2021), a public company, linked to the Ministry of Mines and Energy, has as its attribution the development of simple on-site study that comprises sample collections, physicochemical, chemical and bacteriological analyses, including the analysis of the parameters required by RDC 274/2005.

Also according to the Company of Research and Mineral Resources - CPRM, the mineral waters to be classified undergo analysis of samples in loco and laboratory both chemical components and to characterize the physicochemical properties inherent to the sources. The analyses are required and evaluated by the National Mining Agency - ANM, in compliance with the current code, chapter X, art. 38, and carried out by the Mineral Analysis Laboratories - LAMIN of the Geological Service of Brazil - CPRM, every three years.

Water is regulated by Brazilian states, especially those of underground origin, which for capture requires a grant instrument, according to relevant state legislation. Of the same origin, underground, mineral water is classified as ore and is submitted to the National Mining Agency - ANM² therefore regulated by specific legislation - Mineral Water Code - Decree-Law No. 7,841/1945.

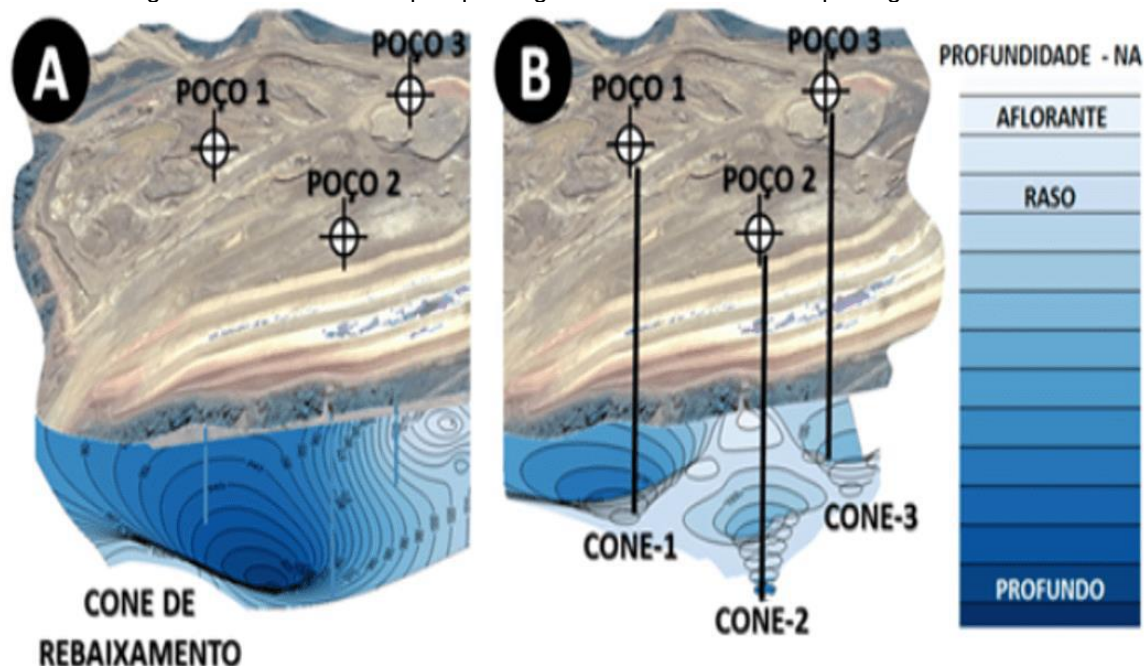
According to Portugal Júnior; Reydon and Portugal (2015, p. 1):

According to the Mining Code, the mining of mineral water must only be requested by a legal entity, requiring the initial request for research through a project whose maximum area is 50 ha. The research permit will have a two-year term from its publication and may be extended for an equal period up to more than once, with the possibility of being assigned and/or transferred and also renounced. After the research deadline, a Final Research Report must be presented.

The requirements for the mining of mineral water are necessary and it is through its compliance and other procedures related to the Mining Concession regimes provided for in the mining legislation that the Union maintains the control and promotion of current environmental and operational water quality guidelines. Thus, in order to obtain mineral water, it is necessary to carry out prospecting research in the search for mineral water mines, based on Exploration Authorization and Mining Concession Regimes, in accordance with the guidelines of the Mining Code, as well as the Mineral Water Code (ANM, 2020).

2 - The National Mining Agency (Agência Nacional de Mineração) – ANM was created on July 25, 2017 by Provisional Measure No. 791. With source headquarters in Brasília, the agency is directly linked to the Ministry of Mines and of Energy, and has patrimonial and administrative autonomy,

Figure 3: Research and prospecting of mineral water with opening of wells.



Source: Minere Institute (2020).

According to Silva (2010), hydrogeological research has gained prominence in the Brazilian market, which represents the realization and prospecting of mineral, mining or decommissioning of mines. This type of research implies opening wells for the exploration of mineral waters.

According to Silva (2010, p. 1):

Such research encompasses a series of studies, which range from the basic geology of the terrain to more complex information and data, such as structural geology and geochemistry. When dealing with the physical aspects of groundwater, especially the direction and direction of preferential groundwater flow, the structural issue of the terrain (folds, faults, fractures, etc.) is taken into account.

In mine prospecting it is important to precisely define the flow of water for well allocation purposes, starting directly from the target center to obtain a better result.

Mineral water is important in human life. Increasingly consumed in modern life, companies have been able to obtain the technical conditions for water collection to fill and maintain a management of the areas of sources, especially because it is an ore expressly consumed and easily contaminated, and requires specific monitoring of health regulatory agencies (ANM, 2020).

The authors consider that there is no conflict between the rules of the Union and the States, considering that not all groundwater is mineral and, therefore, must meet the requirements of the Mineral Water Code (ANM, 2020), which ensures the competence and legitimacy of granting the right of use to the Union.

According to Portugal Júnior; Reydon and Portugal (2015, p. 1):



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Based on a new institutional framework, conceived within a systemic approach to water resources within the hydrographic basin to which the mineral waters belong, in each case, economic agents must present perceptions and adopt commitments and actions that prioritize sustainable exploitation of this resource. , considering the limits imposed by the renewal capacity given by the conditions of the hydrogeological cycles and the broader objectives of preserving these sources as water reserves for the future. It is within this larger context that the necessary analyzes and considerations should be included regarding the life cycle, the actions aimed at the correct destination of the residues generated in the production, commercialization, and consumption.

Mineral water exploration is irregularly distributed in the geography of the territory and many of these water deposits are found in several Brazilian states. Active mineral water mining concessions are a total of 1,236, distributed in Brazil (ASSIRATI, 2018).

The Resolution of the Collegiate Board – RDC 274/2005, revoked by RDC 717, effective as of september 1,2022, addresses sanitary requirements for natural mineral water that meets a specific technical regulation, in order to ensure the maintenance of natural characteristics when it is commercialized. Thus, the control guidelines applied by ANVISA represent a guarantee of offering a quality product to the consumer, requiring mineral water exploration companies, good manufacturing practices – GMP, to ensure that mineral water is in perfect consumer condition (ANVISA).

Resolution 275/2005 of the National Health Surveillance Agency – ANVISA, linked to the Ministry of Health, also brings the need to analyze the microbiological conditions of commercialized mineral water, the guidelines determine the need for tests from laboratory analyses with indicative samples³ and representative samples⁴ of the product.

3 - The sample shown represents the sample indicative of the sample that is condemned when the presence of *Escherichia coli* or thermotolerant (faecal) coliforms is found or when the total count of coliforms and/or enterococcos and/or of *Pseudomonas aeruginosa* and/or chlorestid sulphides or *Clostridium perfringens* is higher than the limit established for the indicative sample (RESOLUTION 275/2005 – ANVISA).

4 - The representative sample is mandatory in compliance with the legal provisions in force. Except for activities that require sampling for investigation (related to the suspicion or identification of problems at the outset, for confirmation or verification of their nature and extent or for information on possible sources of problem) or which require strict inspections (statistical plans with greater power to discriminate failures) as specified in Resolution 275/2005 – ANVISA.



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Table 3 – Microbiological characteristics for Natural Mineral Water and Natural Water.

Microorganism	Indicative sample limits	Representative sample			
		n	c	m	M
<i>Escherichia coli</i> or coliforme (fecal) thermotolerant, at 100 mL	Absence	5	0	--	Absence
Total coliforms, at 100 mL	<1,0 UFC; <1,1 NMP or absence	5	1	<1,0 UFC; <1,1 NMP or absence	2.0 UFC or 2.2 NMP
<i>Enterococos</i> , at 100 mL	<1,0 UFC; <1,1 NMP or absence	5	1	<1,0 UFC; <1,1 NMP or absence	2.0 UFC or 2.2 NMP
<i>Pseudomonas aeruginosa</i> , at 100 mL.	<1,0 UFC; <1,1 NMP or absence	5	1	<1,0 UFC; <1,1 NMP or absence	2.0 UFC or 2.2 NMP
Sulphite reducing clostridia or <i>Clostridium perfringens</i> , at 100 mL.	<1,0 UFC; <1,1 NMP or absence	5	1	<1,0 UFC; <1,1 NMP or absence	2.0 UFC or 2.2 NMP

Source: ANVISA (2005).

Companies wishing to act in the market must properly carry out all the guidelines of sanitary legislation to ensure healthy consumption, presenting a water collection project that must go through various normative procedures (from the Research Application, Positive Research Final Report and Mining Requirement (CAETANO; PEREIRA, DOURADO, 2012).

The Union shall determine through the Water Code groundwater protection measures when it comes to marketing, and the responsibility for maintaining the quality of mineral waters is imposed.

In the last decade, new instruments for analyzing the quality and presence of contaminants have ensured the protection of human consumption waters (ESTEVES, 2012).

In relation to the activity of mining, the parameter is operations that are ordered with the objective of industrial exploitation of the mining environment, inserted processes of extraction of mineral substances, for this reason all private agents must obtain the concession and in relation to mineral water will represent the phase during the execution of the use without environmental compromise of the characteristics of the mineral water extraction environment (COELHO; DUARTE, 2003).

In this respect, the ANM is the body that has the competence to determine mechanisms of regulation, granting and supervision, in relation to plans for exploration and use of mineral resources, including the removal of mineral water from the soil or subsoil, throughout the national territory. Therefore, the ANM has the mission to manage and control all activities involving mineral exploration.

The Mineral Water Code – CAM (Decree-Law No. 7,841/1945) determines the competence of the ANM, which is currently the representative of the obligations and rights that previously belonged to



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the now defunct National Department of Mineral Production – DNPM, in accordance with Law No. 13,575/2017, the process of supervising the exploitation of mineral and potable waters for table use in all its aspects must result in accordance with Art. 9 and 23:

Art. 9. Mining of a mineral, thermal, aerated, table drinking water source or intended for bathing purposes is understood to mean all the work and activities of capturing, conducting, distributing and using water. (...)

Art. 23. The inspection of the exploitation, in all its aspects, of mineral, thermal, aerated and table drinking waters, bottled or destined for bathing purposes, will be carried out by the National Mining Agency - ANM.

Art. 24. The federal, state and municipal health and administrative authorities shall assist and assist the ANM in everything necessary to faithfully comply with this law (BRASIL, 2017, p. 1).

The creation of the National Mining Agency was the new mining framework, and only then were provisional measures no. 789, 790 and 791 of 2017 instituted, which focused on following the constitutional guidelines. This new moment of reassessment and improvement of the legal framework of mining, defines in terms of legislative policies, the competence over the regulation of groundwater under the management of the National Water Agency – ANA, while mineral waters, because they are considered mineral, are managed by the National Mining Agency – ANM (ANM, 2020).

In the Minas Code of 1934, the union's right of private guardianship was determined, therefore, they became the responsibility of the federal sphere, leaving the state management. Only from Decree 78.171/1976, health agencies began to develop a higher level of control in terms of analyses of mineral water quality (SERRA, 2009).

Based on Decree 78.171/1976, several other regulations were created through ordinances of the Ministers of Mines and Energy and Health, with the objective of determining regulatory measures of the sector that generated greater control over mineral water quality standards (SERRA, 2009).

After the creation of new measures, conflicts began to emerge between the ANM bodies and the Health Secretariats, the results constituted measures of supervision and legal regulation that brought differences that generated conflicts of competence with the health agencies.

According to Caetano, Pereira and Dourado (2012, p. 3):

The sanitary control of the quality of mineral waters intended for human consumption, as well as the sanitary inspection of the places and equipment related to the commercialization of the product, are the competences of the Ministry of Health of the Health Departments of the States and Federal District by Decree No. 78.171/1976 (BRAZIL, 1976). However, there is a procedure still active by the entrepreneurs of the mineral water industry in compliance with Decree-law nº 4.147/1942. Ordinance 222/1997 of the DNPM conflicted with Ordinance 326/1997 of the Ministry of Health (BRASIL, 1997), as both establish procedures for hygienic-sanitary conditions and outpatient and laboratory examinations of employees, the latter of which is more detailed.

With Resolution 21/20 published by the ANM, there was a change that had as dynamic the alteration of the internal rules, bringing in this context, the detailing of attributions for cases of mediation and conciliation, with the purpose of ending the conflicts of functions. These guidelines



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were determined in Article 2, XIV, of Law 13,474/2017, in order to establish territorial conflicts between groundwater in the States managed by ANA and mineral waters administered by ANM and other mining rights (ANM, 2020).

Serra (2009) evaluates that water is a primordial resource for life on earth. The quality of water for human consumption represents a factor of the greatest relevance, since quality water promotes health.

Mineral water must meet potability standards according to Anvisa regulations, since, not being perfectly served, it can become a vehicle for the transmission of diseases through infectious agents. Considering that water is a food and intake present in the daily life of every human being, a poor-quality water available can bring great harm to a community (SERRA, 2009).

Esteves (2012, p. 25) analyzes that:

Water is necessary for life and all manifestations of life must be understood as reciprocal, and nothing can be analyzed except within a holistic view of this complex whole that is reality. The set of legal norms that aim to discipline mineral water is an element of social organization and not a static set of norms in application of the purely positivist doctrine.

In this context, all chemical elements present in water should have the appropriate concentrations and quality represented by the absence of contaminants that can cause diseases such as worminosis, typhoid fever, cholera, and other infectious diseases.

There is care for health and water protection and management agencies to avoid contamination of groundwater, destined to the consumption of the population, incorporating a socio-environmental responsibility for water management in the state sphere (SERRA, 2009).

Water being considered as a mineral, constitutes a federal management that demonstrates different policies and criteria that generate conflicts of complex resolutions in relation to municipal, state and federal managements, to the extent that they are economic interests of companies and consumers, as well as representatives who need to make decisions (VAITSMAN D; VAITSMAN M, 2015).

3. MINERAL WATER AND ITS BENEFITS FOR HUMAN HEALTH

According to Vaistman et al., (2015), mineral water benefits the body and its organs, especially the renal system, which has the function of filtering and taking advantage of important elements, eliminating from the urinary system what the body does not absorb. Thus, when water transports nutrients, it also has the function of maintaining a thermoregulation process, which represents the stability of body temperature levels.

For mineral water to become a healthy food, it is necessary to meet the entire process of making groundwater a resource available to be industrialized, it requires stages of research, mining and laboratory treatments to determine the capacity of quantitative service to the industry, as well as



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the conditions of asepsis and microbiological control to guarantee quality for human consumption, a necessary and important condition as a vector of health promotion (ANM, 2020).

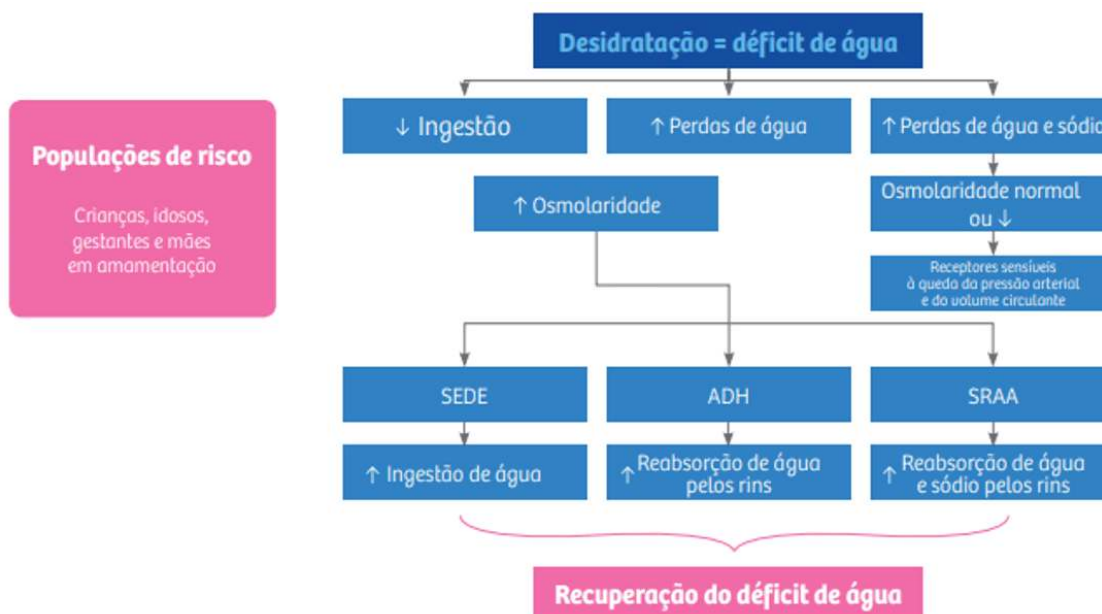
Mineral water brings great therapeutic advantages in that it has essential nutrients to the body's health, such as minerals, calcium, fluoride and magnesium without being subjected to chemical process, therefore, because it is pure, it does not require any human intervention in its composition. In this respect, there are great differences between ingesting mineral water and treated water, considering that natural mineral water has been recognized as medicinal for assisting in the proper functioning of the body's systems (VAISTMAN D; VAISTMAN M, 2015).

In functional terms it is essential to make possible the control of hormones, the due oxygenation of the blood and the expulsion of harmful toxins from the body. At all ages the human being lives better when consuming at least one liter of water per day, to keep the body hydrated, although the World Health Organization – WHO recommends a daily intake of two liters of water per day. For the Brazilian Society of Nutrition Food – SBAN, the amount of water needed for the proper functioning of the organism is variable, considering that it can be affected by climate, clothing, physical activities or other factors, so that the daily recommendation for ingestion varies by age group, from 07 to 12 months to more than 70 years, including pregnant and lactating women, with consumption ranging from 0.8 to 3.8 l/day (IOM, 2006; SBAN, 2016).

In relation to people over 60 years, there is a loss of the ability to thermoregulate body temperature, represented by the feeling of seed, heat or cold. Therefore, in this age group, people are more prone to dehydration. According to the Brazilian Society of Nutrition Nutrition – SBAN, water needs in the elderly are no different from those for young adults. However, there are a number of conditions, both physiological and morbid, that alter the water balance in this specific population, putting them at greater risk in relation to dehydration states (SBAN, 2016).



Figure 4: Care Against dehydration.



Source: Azevedo; Pereira and Paiva (2019).

Dehydration care should also be part of the lives of children and pregnant women, who must maintain satisfactory intake of mineral water in order to keep diuretic function balanced. As mineral water has drug and therapeutic properties in its composition determined by the type of rock it passes through, by the time of permanence and temperature of the aquifer, they can present several compositions, with predominance of certain characteristic chemical elements, such as mineral waters with a higher predominance of ferruginous elements, which has therapeutic indication for anemia problems, allergies and treatment of parasites. On the other hand, alkaline-bicarbonate mineral water has the function of improving gastric, hepatic and pancreatic functioning (KUHNE, 2010).

Sulfurous mineral water, with predominance of the sulfur element, has helped people with rheumatic problems and other varieties of infections and dermatitis. There are still mineral waters that have radioactive elements in their composition, also important in therapeutic activities, especially in treatments in patients with oral problems, enabling the improvement of digestive functioning.

According to Kuhne, (2010), Magnesian mineral waters have a laxative function and, therefore, regulate the intestine and the functioning of the stomach, those with carbonic properties have moisturizing functions for the skin. Iodized waters have therapeutic functions in organic inflammatory situations, insufficiency of the thyroid gland, and rheumatism, liver and kidney problems. Litanated mineral waters, on the other hand, are of great importance in the uric acid purification process and have a calming function.

Calcium-rich mineral waters have great therapeutic properties for bone strengthening, osteoporosis disease and improvement of muscle conditions, and those with a high potassium concentration are able to maintain central nervous system toning (KUHNE, 2010).



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The great health benefit of mineral water consumption is unquestionable, considering its effectiveness in contributing to nutrition and health of the organism.

According to Azevedo; Pereira and Paiva (2019, p. 11):

Water can contribute to the intake of some micronutrients, however, in Brazil, most bottled or tap mineral waters are not considered important sources of these minerals. The European classification of mineral waters describes that waters rich in sodium contain > 200 mg/L, in calcium > 150 mg/L, in bicarbonate > 600 mg/L, in magnesium > 50 mg/L and fluorine > 1 mg/L. There are no references for potassium, as it is generally not representative in water.

Mineral rich in minerals, salts and elements that strengthen the body. The European classification of mineral waters demonstrates the levels of presence of micronutrients important for health promotion.

The human body to be healthy must remain hydrated, considering that the urinary system of which the kidneys are part, have about 83% of water, as well as the cardiovascular system, lungs and blood system, has around 80%. Therefore, the body needs to be perfectly hydrated to maintain digestive functions and cell nutrition, in addition to the importance of water in the lubrication function of vision and bone system, functioning of the nervous system and balance of body temperature (KUHNE, 2010).

According to Azevedo; Pereira and Paiva (2019), the water needs of the elderly are no different from those of young adults. However, there are a number of conditions, both physiological and morbid, that alter the water balance in this specific population, putting them at greater risk in terms of dehydration. Children have important physiological differences compared to adults, such as their greater surface area in relation to body mass, less ability to produce sweat, and greater water metabolism.

In this respect, the human body depending on the activities performed, age, height and body weight, require a higher or lower water intake. Considering the above variables, human water intake should be sufficient to replenish the body's needs.

4. FINAL CONSIDERATIONS

The present work had as a guide question: What is the importance of mineral water quality for human consumption and health promotion? It is possible to conclude that to ensure the quality of water for human consumption and quality of life, compliance with regulatory legislation and technical monitoring in the industry from the packaging and microbiological control, enable guarantee of the final quality of mineral water, to be made available in the commercial use of mineral water sources as safe food for human consumption.

These aspects related to mineral water mining, for the quality of human consumption and health promotion, showed that the guidelines since research, mining and processing, that is, industrialization, from 1976, began to have a stricter control of water quality through the agencies responsible for ensuring protection to the health of consumers.



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It was evidenced that mineral water brings great health benefits, where the different levels of existing nutrients help in the most diverse health problems, to the extent that its drug properties are recommended in treatments of various diseases that affect human health. Due to the presence of a wide variety of mineral salts and natural chemical elements in the composition of mineral waters, these present beneficial characteristics in disease treatments, considering the prevalence of each type of mineral water, which characterize it in: ferruginous, alkaline-bicarbonate, sulfurous, radioactive, magnesian and iodized, can aid in therapeutic activities in medicinal treatments in patients.

In terms of public health, there are several problems in the body that can be treated with mineral waters rich in prevalent elements that give specific characteristics to waters, where these therapeutic properties provide health benefits from regular consumption of mineral water, as well as other uses such as balneotherapy, etc.

The manifestations and legislative decisions meet the guidelines of the Mining Code and the Water Code and the new resolutions of 2017, which established the National Mining Agency - ANM and the extinction of the National Department of Mineral Production - DNPM, became a mechanism efficient and fast in solving mining problems.

The actions of the National Mining Agency - ANM as a Federal Public Entity responsible for the management and regulation of the Brazilian mineral heritage, operating from the activities of mining, processing and commercialization of mineral products, in addition to promoting the mineral sector, it performs an important function by inspecting the collection of the royalty called Financial Compensation for Mineral Exploration - CFEM, including the transfer to Municipalities and States, emphasizing the redistribution of its rate between IBAMA, CETEM and MCT/FNDCT, contributing to the integration and development of these sectors, for the benefit of society.

Mineral waters are controlled by the federal administration, through the ANM, in the monitoring of mineral water extraction activities. The current guidelines have facilitated the processing of the mining exploration process, providing an increase in the production and consumption of mineral water, materialized by the population's confidence in the efficient control of the quality of the available water, faithfully submitted to compliance with Anvisa regulations and the legislation of the ANM.

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