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EVALUATION OF THE WATER OF ARTISIAN WELLS OF THE DISTRICT OF SANTANA MUNICIPAL OF PARAÍSO DO TOCANTINS - TO.

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Summary

Monthly water samples from four shallow artesian wells from four residences located in four points of the district of Santana municipality of Paraíso do Tocantins were collected between January and July of 2018. Physical and chemical analyzes pH, Turbidity, Electric conductivity, Dissolved Solids, Chemical Demand of Oxygen, Dissolved Oxygen and Hardness were performed according to Standard methods for the examination of water and wastewater. Microbiological analyzes by means of the Multiple Tubes technique, according to procedures described by the National Health Foundation and compared with Portaria n °. 2,914 of January 12, 2011, from the Ministry of Health. The water from the analyzed wells presents chemical and microbiological control parameters according to the specifications indicated by the legislation.

Keywords: Artesian well; public health; Water

Introduction

The use of artesian wells has been a good alternative for people to consume water from underground reservoirs (STRUCKMEIER et al., 2005; HELBEL et al., 2008). Groundwater, most often from wells, is generally less contaminated by biological and chemical factors than surface water sources, since they are not exposed to various pollutants (ECKHARDT et al., 2008). Water is one of the most important natural resources, indispensable to life and human activities for its functions in public, industrial, agricultural and aquatic life preservation and can serve as a vehicle for various biological and chemical agents (Gomes, 2005). Water with a crystalline and odor-free appearance may not be free of harmful microorganisms (FARIA, 2006). To obtain quality water, analyzes are used that are within the parameters established by the Ministry of Health, to detect if the water is within acceptable standards to be consumed (Brazil, 2011). Reservoir monitoring helps detect contamination and contamination of water by assisting in treatment, minimizing the use of chemicals for purification (STRUCKMEIER et al., 2005). The human consumption of water, according to appropriate drinking standards is defined by PORTARIA No. 2,914 December 12, 2011 of the Ministry of Health (MS) recommends the maximum permissible values for the bacteriological, organoleptic, physical and chemical characteristics of drinking water (MACÊDO, 2005; Page 6 The aim of this study is to determine the physico-chemical and microbiological parameters of artesian well water in the district of Santana, in the municipality of Paraíso do Tocantins, with the aim of comparing them with ordinance no. 2,914, of December 12, 2011 of the Ministry of Cheers.

Methodology

Monthly water samples from four shallow artesian wells of four residences located in four points of the district of Santana municipality of Paraíso do Tocantins were collected between January and December 2018. The procedures adopted for collecting and transporting the samples followed the National Collection and Preservation of Samples of the National Water Agency and Environmental Company of the State of São Paulo (CETESB, 2018). Glasses with 500 mL capacity were used, 0.02 g or 1.0 mL of 2% sodium thiosulfate solution was added to each flask. Physical and chemical analysis of pH, Turbidity, Electrical Conductivity, Dissolved Solids (SD), Dissolved Oxygen (OD) and Hardness were carried out at the Sanitation Laboratory of the Federal Institute of Education, Science and Technology of Tocantins - Campus Paraíso do Tocantins, according to Physical-Chemical Methods of the Standard methods for the examination of water and wastewater (APHA, 2005). Microbiological analyzes of total and thermotolerant coliforms by means of the Multiple Tubes technique, according to procedures described by the National Health Foundation (FUNASA, 2006) and compared with Portaria n °. 2,914 of January 12, 2011, of the Ministry of Health (BRAZIL, 2012). In the residences visited, observations were made as to the type of well, the type of well sealing, distance from the septic tanks, presence of trash in the yard and neighborhoods of the houses, water coloration, type of water collection, or mechanical action..

Results and discussion

The results of the physical-chemical and microbiological analyzes of the water samples from the artesian wells of the Miranorte-TO urban districts are shown in Table 1.

Table 1. Results of the physical-chemical and microbiological analyzes of the water samples from the artesian wells of the urban areas of Miranorte-TO:

CHEMICAL AND MICROBIOLOGICAL PHYSICAL PARAMETERS	Well 01	Well 02	Well 03	Well 04	Ordinance 2914/2011
Chloride (mg. L^{-1})	10,90 □ 0,10	15,90 □ 0,22	5,90 □ 0,10	7,80 □ 0,12	250 mg. L^{-1}
Electrical conductivity (□S.cm^{-1})	200,20 □ 0,12	241,00 □ 0,10	260,30 □ 0,12	250,50 □ 0,12	----------
Hardness (mg. L^{-1})	55,90 □ 0,20	58,90 □ 0,12	61,10 □ 0,10	56,90 □ 0,20	500mg.L^{-1}
Dissolved Oxygen (mg. L^{-1})	7,28 □ 0,12	7,55 □ 0,15	7,60 □ 0,11	7,05 □ 0,14	----------
Hydrogen ionic potential (pH)	6,05 □ 0,10	6,15 □ 0,12	6,13 □ 0,15	6,25 □ 0,18	6,0 a 9,5
Dissolved solids (mg. L^{-1})	60,10 □ 0,11	61,21 □ 0,22	75,10 □ 0,15	65,13 □ 0,25	1000 mg. L^{-1}
Turbidity (NTU)	0,46 □ 0,11	0,21 □ 0,10	0,16 □ 0,11	0,25 □ 0,12	NTU
Total Coliforms (NMP / 100mL)	Absence	Absence	Absence	Absence	Absence / 100 mL
Thermotolerant coliforms (NMP / 100m	Absence	Absence	Absence	Absence	Absence / 100 mL

In Brazil, drinking water standards for human consumption are established by Decree MS 2,914, dated December 12, 2011 (BRAZIL, 2011), which does not specify maximum limits for the parameters electrical conductivity, dissolved oxygen and establishes maximum limits turbidity of drinking water at 5.0 NTU; total solids in 1000 mg.mL-1; electrical conductivity of 500 mg.L-1; pH hydrogenation potential in 6 to 9.5 total and thermotolerant coliforms in absence in 100mL. The total and thermotolerant coliform counts can be estimated fecal contamination, considering that high counts of these groups of microorganisms are generally related to significant levels of enteropathogens. (Alder et al., 2008). The analyzed samples are in agreement with the legislation regarding the analyzed parameters. The wells surveyed had between 4 m and 6 m depth. The houses had distant septic tanks no more than 27 meters from the well. Waichel et al. (2003) report that of the total of 92 houses, the 83% that presented septic tanks at a distance of 10 and 30 meters in relation to the well, were more subject to contamination by coliforms. The absence of coliforms in the residences may be related to the treatment with hypochlorite, including in the water box made by the residents, also the distance from the well of any point of contamination, such as dumps and cesspits may have influenced the reduction of coliforms.

Conclusions

It is concluded that the water of the analyzed wells presents chemical and microbiological parameters according to the specifications indicated by the legislation established by decree no. 2914/11, with the exception that other parameters are analyzed for the effective guarantee of their quality.

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