Groundwater monitoring network in Acre sedimentary basin

Pereira, L.A. da C.[1], Franzolin, T.A.[1], Rempel, K.[1] and Barbosa, F. de A.[1]

[1]Brazil Geological Survey (CPRM), luiz.pereira@cprm.gov.br

The expansion of the Integrated Groundwater Monitoring Network (RIMAS), a project by the Geological Survey of Brazil, made possible the construction of eight piezometers in the sedimentary basin of Acre, Acre state, Brazil, in 2013 and 2014. Their allocations took into account criteria intrinsic to hydrogeology, superficial distribution in the aquifer, logistical aspects of access and security, as well as socio-economic aspects and agreements with the surface owners.

These piezometers are situated in the Içá aquifer system (overlaying Solimões aquifer system) which has good quality groundwater in its natural condition, without restrictions for human use, Cajazeiras et al [1]. Potentially this is the most important aquifer of Acre. The piezometers are four-inches in diameter with depths ranging from 71 m to 150 m, with the largest boreholes reaching the maximum limit of 164 m.

The lithological profiles of the boreholes named Padre Arnaud, Vila Olímpica, Darcy Bezerra and Canela Fina are predominantly clayey-sandy with grain size ranging from clay to fine sand; the ones named Fazenda Renascer, Sítio São Vicente, Vila Santa Rosa and Emídio Vasconcelos have predominantly sandy profiles, grading from fine sand to clayey-sand, and the thickness of the water bearing layers range from 2 m to 80 m.

The pumping tests lasted 480 minutes and the recovery lasted 240 minutes. The volumetric method was used for the flow measurements. Static water levels varied between 6.05 m and 31.82 m, and the total downgrades varied between 3.0 m and 53.29 m. The dynamic water levels varied between 12.4 m and 80.49 m. The specific flow rates ranged from 0.035 m^3/h/m to 3.0 m^3/h/m. The reference flow rated from 0.38 m^3/h to 46.67 m^3/h.

The water analysis consisted in the determination of cations and anions and mercury, in addition to metals, non-metals and selenium. In piezometer Darcy Bezerra the values of its main cations are relatively high, as follows: calcium 33.66 mg/L, potassium 6.69 mg/L, sodium 4.70 mg/L, magnesium 4.53 mg/L. According to data from 14 wells of the State Department of Paving and Drainage (DEPASA) of the state of Acre, the pH is alkaline ranging from 8.2 to 9.2, with an average of 8.87, and turbidity from 1.31 to 5.65, with an average of 3.21, Cajazeiras op. cit. [1].

Grain size analyses were conducted, using standard operational procedure, with the analytical results presented in individual tables. The final result was based on the grain size chart classification of Wentworth [2]. The results of these analyses supported the field observations.

Additionally, some physical-chemical and bacteriological analysis were carried out, with most results meeting law requirements.

After the implementation phase of the piezometers, sensor equipments were installed for regular monitoring. The first results showed drawdowns of water static levels in the order of 0.864 m to 2.855 m, considering the period between June 15, 2015 and November 19, 2015.

References:

[1] Cajazeiras, C. C. de A. et al. (2015) In: *Geodiversidade do estado do Acre*: CPRM, 105-116

[2] Wentworth, C. K. (1922) In: *The Journal of Geology*: UNIVERSITY OF CHICAGO PRESS, 377-392