



Application of step-drawdown test for planning agricultural groundwater well maintenance in S. Korea

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Well efficiency decreases with time after development and the pumping rate is reduced sharply at a certain point. However, the rapid decrease of the efficiency definitely depends upon the physical characteristics of the aquifer, chemical properties of groundwater, pore clogging by adsorptive/precipitable materials, and use of groundwater well. In general, it is expected that an adequate and ongoing maintenance for the well is effective in extension of operating periods because major maintenance frequency requirement at municipal wells placed in the crystalline rock aquifer is known to be relatively longer.

The proportion of agricultural wells (583,748) against the total groundwater ones (1,380,715) is 42.3% in 2011, S. Korea. Groundwater use accounts for 1.9 billion m³/year which indicates 48.9% of total amount available groundwater resources. Approximate 69% of the total agricultural public wells placed in crystalline rock aquifer have passed more than 10 years after development.

In this study, the increase of well efficiency before and after the well disinfection/cleaning for agricultural groundwater wells in the mountains, plains, and coastal aquifer with the data of step-drawdown test was evaluated, respectively. With the concept of critical yield, the increase of available amount of groundwater was quantitatively analyzed after treatment. From the results, well efficiency increased approximately 1.5 to 4 times depending on pumping rate when the proper disinfection/cleaning methods to the wells were applied. In addition, it showed that the pumping rate of approximate 4-8% with the critical yield from step-drawdown test increased and these effects were the highest in wells which are more than 10 years elapsed. Therefore, it would be concluded that the well disinfection/cleaning methods for the purpose of increasing the efficiency are more effective for the wells that are older than 10 years.