The variable u is

$$u = \frac{r\,S}{4Tt}, \qquad (3)$$

where S is the aquifer storage coefficient and t is time. The Theis solution assumes that the aquifer is infinite, confined, and homogeneous; that equipotentials are vertical; and that the well diameter is negligible. The total drawdown from both wells in the aquifer is determined by linearly superimposing (summing) the contributions from each well.

A MATLAB code was developed to predict the drawdown (Attachment 1). The MATLAB code predicts the spatial drawdown due to pumping at several wells at a specified time. The code allows the user to define the number of wells, aquifer properties (T and S), and a pumping schedule for each well. MATLAB commands used for this code are shown in Attachment 1. The code requires the text file Welldat.dat (Attachment 1), which includes the X-location, Y-location, time that pumping starts, time that pumping ends, and pumping rate for each well.

The MATLAB code requires an estimate of T and S for the Floridan Aquifer. Williams and Kuniansky (2016) report T and S values for 11 wells in the upper Floridan Aquifer. One well had an anomalously low T value and was excluded from our analysis. The T and S values for the remaining 10 wells were averaged to define the values of T *and* S *used here* (Table 2). The predicted drawdown at the proposed production wells after 4 years of pumping at the TPM site is shown in Figure 1. These results indicate that the basin north of the St. Marys River Basin will see drawdown of less than 1 foot due to TPM pumping, the basins south and west of the St. Marys River Basin will have drawdown between 1 foot and 2 feet, and the basin east of the St. Marys River Basin will show drawdown of slightly over 2 feet.

It is important to recognize that the results presented here represent conservative values. The drawdown was estimated using the Theis (1935) solution. This solution neglects leakage from the overlying Hawthorn group. Leakage, or downward flow, from the Hawthorn will lead to less drawdown in the Floridan Aquifer. We attempted to use the Hantush and Jacob (1955) solution for leaky aquifers to predict the drawdown, but the solution is prone to numerical errors given the hydraulic properties germane to the Floridan Aquifer and the distances to the edge of the St. Mary's River Basin and yields spurious results.

References Cited

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