APPENDIX C

Approximation Method for Determining River Stages Used in Flow Model

Calculation of Efficiency of Well 3

APPROXIMATION METHOD FOR DETERMINING RIVER STAGES USED IN FLOW MODEL

Step 1. The elevation of the Croton River on March 30, 1988 was estimated from staff gage CRE and the gradient of the Croton River obtained from the USGS topographic sheet. At the upper gaging station, the river was flowing at a rate of 538 ft^3/sec.

Step 2. Using a rating curve developed by the USGS for the upper gaging station, the reading on the staff gage which corresponds to the 538 ft^3/sec discharge was determined to be approximately 3 ft. The hydraulic head estimated for each line element in the calibration run (March 30) was assumed to accurately represent the 538 ft^3/sec discharge in the river.

Step 3. The mode and median river discharges were calculated using the last three years of data. The median was equal to 26 ft^3/sec and the mode was 11 ft^3/sec.

Step 4. The readings on the staff gage which correspond to the mode and median discharges were estimated using the rating curve.

Step 5. These readings were subtracted from the 3 ft reading estimated to represent conditions present on March 30.

Step 6. This difference was subtracted from the line element heads in the final calibration run to obtain the line element heads which represent the mode and median discharges.

Calculation of Efficiency of Well 3

Calculations were performed to estimate the efficiency of Well 3 from its actual and theoretical specific capacities. The actual specific capacity of a well is defined as follows:

$$\text{actual specific capacity} = \left[\frac{Q}{s}\right]_{\text{actual}}$$

where:

Q = discharge rate of well
s = drawdown at 1 day

The actual specific capacity measures the yield of a well per unit drawdown measured in the field. For pumping well 3, the actual specific capacity is equal to:

$$\frac{1328 \text{ gpm}}{21.68 \text{ ft}} = 61.3 \text{ gpm/ft}$$

The theoretical specific capacity of a pumping well is given by (Driscoll, 1986):

$$\left[\frac{Q}{s}\right]_{\text{theoretical}} = \frac{T}{264 \log\left[\frac{0.3\ T\ t}{r^2 S}\right]}$$

where:

T = transmissivity (gpd/ft)
t = time (days)
r = radius of well (ft)
S = storativity (dimensionless)

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