

**Evapotranspiration Measurement and Simulation due to Poplar
Trees at a Phytoremediation Site**

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(Abstract)

A railroad yard in Oneida, Tennessee was contaminated with creosote in the 1950s and 1960s through cross tie treatment. The problem was discovered in 1990 and phytoremediation in combination with an interception trench was chosen as the remediation strategy. Hybrid poplar trees (1,036) were planted in 1997 within 0.7 acres. The goals of the phytoremediation system are to prevent migration of the contaminant off the site and clean up the contaminant in-situ. This study is focused on quantifying the rate of evapotranspiration of the phytoremediation system and then determining the effect on groundwater flow. This will be accomplished by quantifying evapotranspiration using a water budget, applying White's Equation, comparing groundwater recession curves, creating a groundwater flow model, and examining water table elevations obtained at the site. Calculations of water use by the poplar trees in early September 1999 ranged from 0.62 to 1.34 gal/day/tree. The volume of evapotranspiration calculated for the trees during 1999 is 140,292 gallons. Total evapotranspiration determined by the water budget for 1998 is 1,570,064 gallons. Evaluation of the water level data over a period of several years shows significant lowering of the water table (fluctuations of up to four feet) during the summer and fall months due to evapotranspiration. Although calculated evapotranspiration rates are not as high as seen in the literature, continued monitoring of the site should show large increases in evapotranspiration rates in the future as the poplar trees mature.

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