

ABSTRACT

FATE OF WASTEWATER NITRATES AND TOTAL DISSOLVED SOLIDS WITH VARIABLE LAND APPLICATION RATES

Relationships between effluent application rates, transport, fate of total dissolved solids (TDS), and nitrates through the vadose zone were researched and used to evaluate effluent disposal practices at Porterville, California Wastewater Treatment Plant (WWTP) disposal sites. During dry cycles, ammonium is nitrified by aerobic microorganisms. During flooding cycles, nitrate is denitrified by anaerobic microorganisms and leaves the soil as nitrogen gas. The remaining ammonium and nitrate are transported through the vadose zone to groundwater. In contrast, nonreactive components of TDS travel slowly through the ground surface, vadose zone, and reach the aquifer at relatively high concentrations. The Porterville WWTP reclamation areas' downgradient monitor wells show elevated nitrate and TDS concentrations relative to the upgradient monitor well, impacting groundwater and vadose zone. The rate of ammonium and nitrate transport and fraction removed (as N_2 gas) in the vadose zone is strongly related to soil properties, application rate, and flood-dry cycle pattern.

Jojo Butlig
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