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IMPLEMENTATION OF A GROUNDWATER RECHARGE REUSE PLAN AND UNDERSTANDING THE FATE AND TRANSPORT OF EMERGING CONTAMINANTS IN A FLOOD-PLAIN AQUIFER, CARSON RIVER WATERSHED, NEVADA

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ABSTRACT: The Dayton area of Lyon County, Nevada, served by Lyon County Utilities Department ("LCUD"), will continue to experience rapid population growth. Master planning for the LCUD service area includes a conjunctive use plan and a groundwater recharge reuse plan ("GRRP"). Implementation of the GRRP will augment natural and artificial recharge in a small hydrographic sub-basin, which is recharged by the Carson River. A one-year GRRP pilot project at the Rolling A treatment plant site will include water quality analysis from 15 groundwater monitor wells and fate-and-transport analysis of treated effluent discharged via infiltration basins to the flood-plain aquifer. Analytical data will be collected for the following constituents from the wells and the effluent: 1) fecal coliform, total dissolved solids ("TDS") and nitrates; 2) selected metals (e.g., arsenic, manganese and iron); 3) disinfection by-products ("DBPs") formed by the reaction between organic matter in potable water or wastewater, and a disinfectant such as chlorine including Trihalomethanes ("THMs") and Halo-acetic acids ("HAAs"); and 4) emerging contaminants such as endocrine disruptor compounds ("EDCs") and pharmaceuticals/personal care products ("PPCPs"). The fate and transport analysis of representative emerging contaminants and other constituents within the flood-plain aquifer will be performed using numerical model simulations to determine: 1) the down-gradient distance that a new potable water supply well could be permitted and constructed in the flood-plain aquifer; 2) the potential effects of recycled water on the Carson River eco-system; and 3) optimal operating conditions for RIB discharges. LCUD recognizes that the quality and amount of defensible data collected as part of the pilot project will be needed to address public concerns with, and support regulatory permitting of, supplementing recharge to the alluvial aquifers with treated effluent (this is the first project of its kind in Nevada). The use of recycled water in maintaining a balanced recharge-discharge relationship in the Carson Plains sub-basin will be critical for the projected growth and development in the Dayton area, and the fate-and-transport analysis of emerging contaminants collected will provide a valuable resource for other, similar projects in Nevada and elsewhere within the arid western United States. As with most jurisdictions, the State of Nevada has no guidance for regulating emerging contaminants in the context of potential impacts to human health and the environment.

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