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DEVELOPMENT OF SULFUR-35 AS A TRACER OF GROUNDWATER MAR OPERATIONS

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ABSTRACT: Determining travel times near managed aquifer recharge (MAR) sites has previously involved extensive fieldwork with deliberately introduced gas tracers (SF_6 , ^{124}Xe , ^{136}Xe) or has utilized environmental age tracers (tritium/ ^3He , CFC) that are unable to resolve groundwater ages between 0 and 2 years--the critical time scale for managing MAR sites. Sulfur-35 is potentially a useful environmental tracer that is naturally produced in the atmosphere by cosmic radiation and enters the hydrologic cycles as dissolved SO_4 through precipitation. Sulfur-35 is radioactive with a half-life of 87 days, which is ideal for investigating recharge and transport of MAR groundwater over the multi-month-long timescale of interest to water managers and regulators. The primary goal of this study is to evaluate the potential of the ^{35}S method as a groundwater dating tool at the Rio Hondo Spreading Grounds, a coastal MAR operations in California where the flow has been well characterized using both introduced and environmental tracers. We have analyzed surface water from the spreading ponds and groundwater from shallow proximal monitor and production wells. Higher ^{35}S activities were detected in source water, which included surplus runoff and reclaimed wastewater, than in groundwater. Initial results suggests that Sulfur-35 has the potential to become an important tracer of groundwater flow and travel times near MAR sites.

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