

Tracing recharge water from spreading ponds: Insights from a decade for studies

Jordan F. Clark, Associate Professor, Dept. of Earth Science,
University of California - Santa Barbara, Santa Barbara, CA USA

ABSTRACT

Determining hydraulic connections and travel times between recharge facilities and production wells has become increasingly important for permitting and managing MAR operations. This knowledge is critical for examining soil aquifer treatment and assessing the potential for contamination. During the last decade a number of geochemical approaches have been developed to trace the movement of recharge water. Tritium/He-3 dating can be used to estimate "far field" transport and mixing at production wells. Transport in "near field" can be imaged with deliberate tracer experiments. Because the volumes of spreading basins are very large, typically in excess of 1 billion liters, non-reactive tracers that can be economically introduced at a sufficient concentration to allow quantification after at least a 100:1 dilution must be used. Studies have shown that sulfur hexafluoride, boron isotopes (as borate), and isotopes of noble gases (e.g., He-3, Xe-124, and Xe-136 satisfy these conditions. Injection methods and results from six deliberate tracer experiments will be discussed highlighting the success and failures of the deliberate tracer method for estimating travel times and hydraulic connections.