

## CHAPTER 8

# Particle Tracking

### COMMON ERRORS IN PARTICLE TRACKING

- A capture zone or contributing area is delineated by reverse PT using too few particles. Flowpaths produced by reverse PT can be sensitive to number and placement of particles especially when particles originate in areas of converging flow (e.g., near a pumping well or gaining stream).
- The modeler assumes that time of travel calculated by PT directly corresponds to estimates of groundwater age from tracers sampled in the field.
- The modeler assumes that the arrival time of a contaminant at a receptor calculated by PT accurately characterizes the time of first arrival. First arrival times are affected by dispersion, which is not included in a PT code.
- The modeler fails to account for weak sink effects on capture zones and aquifer residence time calculations.
- The modeler is not aware that distorted layers can adversely affect flowpaths and travel times calculated by PT.
- PT is performed for a quasi-3D groundwater flow model. Quasi-3D models do not explicitly include confining layers in the grid/mesh and therefore groundwater flowpaths and travel times are not correct because travel through the omitted units is not represented.
- The horizontal nodal spacing in the groundwater flow model is too coarse around sources and sinks and the flowpaths calculated by PT are not representative of field conditions.
- The horizontal nodal spacing is too coarse to capture important changes in hydraulic conductivity in a heterogenous aquifer and the flowpaths calculated by PT are not representative of field conditions.
- The modeler processes PT results from a 2D flow model and depicts particle tracks that cross. Flowpaths may converge but never cross. When particle tracks in a 3D model are projected onto a plane, flowpaths may appear to cross, but particle tracks depictions in a 2D model never cross.
- The modeler fails to test the sensitivity of PT travel time results to values of effective porosity.