

Applying the Pesticide Root Zone Model to Evaluate the Fate and Transport of PFAS in Soil and Groundwater



Services / Expertise

Environmental Systems Modeling
PFAS Fate and Transport Modeling
EPA's Pesticide Root Zone Model (PRZM)

Markets

NGO, policymakers, regulators, producers of residuals and farmers

Date Completed

2019, 2021

Project Owners

Northeast Biosolids and Residuals Association

National Council for Air and Stream Improvement, Inc.

Project ID#

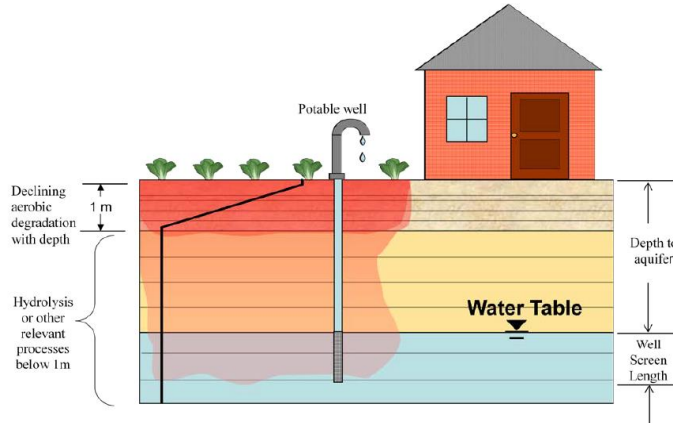
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Pesticide Root Zone Model (PRZM) Groundwater Leaching Conceptual Site Model

STONE'S ENVIRONMENTAL SYSTEMS MODELING team applies quantitative, physically-based modeling techniques to estimate the fate and transport of PFAS in soil and water. This work includes identifying models and parameters for setting screening-level criteria needed to regulate permissible PFAS concentrations in soil and land-applied residuals. Two examples of our recent project experience are provided below.

PFAS Leaching Modeling of Land-Applied Biosolids in Maine (Northeast Biosolids and Residuals Association)

Stone applied the US EPA's widely-accepted model Pesticide Root Zone Model (PRZM) to estimate the leaching of PFOA and PFOS (the two most prominent PFAS chemicals and the ones most regulated) to groundwater. Model scenarios based on both conservative and more typical conditions (e.g. sorption and groundwater depth) were simulated and tailored for a range of Maine climate and soils conditions specific to agricultural land applications of biosolids. Multiple different alternative scenarios, including biosolids application rates and PFAS concentrations, were also assessed under the range of Maine weather and soils conditions evaluated. The suite of simulations provided results that allow for better informed determination of the relationships between PFAS concentrations in land applied biosolids and their likelihood and magnitude of presence in groundwater.

Development of a Guidance Document for Applying the Pesticide Root Zone Model in Screening-Level PFAS Assessments (National Council for Air and Stream Improvement, Inc.)

Stone led the development of a guidance document for using PRZM as a screening-level tool to assess the potential for PFAS to leach into groundwater from land applied residuals. The guidance document includes a general overview of the model with description of the more critical model inputs for PFAS, a step-by-step example of how to implement PRZM simulations for PFAS, and an example comparison of PRZM simulation results with field data. The PRZM modeling framework described in this report can be used by policymakers, regulators, and producers of residuals to identify adequate management strategies that balance the mass loading rate of PFAS in land applied residuals with PFAS concentrations in groundwater sources.