

TITLE: Use of SESOIL for Modeling the Fate and Transport of Metals

**DATE
EFFECTIVE:** August 2003

HISTORY: Update of VA30007.09.022 - Revision was necessary to reflect changes in the rule citations that became effective in August 2014.

KEYWORDS: SESOIL, metals, vadose zone modeling, protection of ground water meeting unrestricted potable use standards

**RULE/
AUTHORITY:** OAC 3745-300-07(F)(4), 3745-300-07(G)

QUESTION: Can the SESOIL model be used for metals?

ANSWER: Yes; however, the use of SESOIL to model the leaching of metals is limited to the partitioning algorithm. Though SESOIL has other algorithms to model the fate and transport of metals (cation exchange and metal complexation), the model has not been scientifically validated in accordance with OAC 3745-300-07(G)(2)(a)(ii) for these processes.

The Ohio EPA Voluntary Action Program considers the partitioning algorithm in SESOIL with conservative inputs for K_d and solubility as being scientifically valid in accordance to the rule. This is similar to the generic approach of calculating a standard using the partitioning equation in the Ohio EPA (1996) guidance plus a dilution attenuation factor (DAF). However, the use of SESOIL allows for the additional consideration of a property-specific separation between the contaminated soils and the ground water zone requiring protection.

When using SESOIL for metals, it is important to select an appropriate K_d factor and solubility value. Metals can occur in a variety of oxidation states and complexes, which may affect a given metal's solubility. The solubility of metals is also dependent upon the composition of the contaminated soil. The primary soil physio-chemical characteristics that dictate the solubility of metals are pH, temperature, alkalinity, oxidation–reduction potential (REDOX) within the soil matrix. In addition, the soil pore water interacts with the type and abundance of minerals and organic matter within the soil matrix. The composition of the waste that produced the soil contamination will

also significantly influence the mobility of the metal constituents. Thus, an understanding of the form of the metal(s) at the property is important for selecting an appropriate K_d and solubility value to be used in the SESOIL model.

See also: VA30007.14.008 Appropriate SESOIL Version to use for the Voluntary Action Program.

SUMMARY:

SESOIL Modeling can be used in the Voluntary Action Program to model the movement of metals through the vadose zone if partitioning (K_d) is the process used to model the attenuation of the metal. The Volunteer needs to justify the selected K_d factor and the solubility-based chemical/physical characteristics of waste and subsurface materials.

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CONTACT:**

For any questions concerning this issue, please contact the VAP Central Office at (614) 644-2942 or DDAGW VAP support staff at (614) 644-2752.