



Engineering Sciences Section – 2007

C15 A Reality Check on EPA Reference Values and Model Equations in the Soil Screening Level Guidelines

Todd R. Crawford, BA*, Crawford Independent Analysts, 16 Wintergreen Road, Queensbury, NY 12804

The goal of this presentation is to present procedures for the review of reference values, and issues related to the use of non-peer reviewed models will be discussed.

This presentation will impact the forensic community and/or humanity by demonstrating the use of some methods to review and identify potential errors in reference data, and will document a serious problem with a model equation developed by the EPA and incorporated without significant scientific review into most State's regulatory guidance.

Environmental investigations frequently require the development of conceptual models to fill in the data gaps and provide a method for assessing what has happened and will happen at a site. These models are usually based on procedures promulgated by the EPA that have been incorporated in State and local regulations. Unfortunately, many of the EPA model equations and reference values have not been given any peer review for scientific legitimacy, nor have they been validated by any sort of comprehensive field investigation. When confronted with short-comings in the performance of the models, the regulatory response is generally to presume that more site-specific information is needed, and/or to opine that the model is "conservative" and therefore satisfies their requirement to be protective. Rarely is an investigator prompted to develop a more accurate model using scientific procedures.

The EPA Soil Screening Level Guidelines (SSL) have been incorporated almost wholly into State and local environmental regulations without any scientific review. One of the equations in the SSL is supposed to model the concentration at which soil is saturated with an organic contaminant, the C_{sat} calculation. Dimensional analysis shows that this equation does not model the soil saturation concentration. The erroneous equation was apparently created by a desire for an expedient solution to the problem. The model is used in many State's regulations and this apparently is the first scientific review to identify the problems in the model.

Recently, it was shown that reference values, such as those provided in the SSL, may be in error by several orders of magnitude (USGS). A simple review of the reference values in the SSL using routine sorting and calculation functions in a spreadsheet program showed several values are questionable. A review of the scientific literature and web-based information sources showed that more reasonable values exist, and the corresponding values in the SSL may have been transcribed inaccurately or may not have been checked for accuracy and reasonableness.

Given that most State and local environmental regulations are based almost entirely on procedures handed down from the EPA, most of which have not received any rigorous scrutiny, it is reasonable to assume that many of these routines are riddled with serious errors and marginal scientific merit. It is recommended that environmental investigators involved in developing a conceptual site model should carefully review the equations and reference values provided for accuracy and reasonableness. Excuses for shortcomings in the regulatory approaches should not be tolerated and more accurate models based upon legitimate science should be put forward by site investigators.

Soil Screening Levels, Reference Values, Model Equations