Summary

This Special Technical Publication (STP) on Risk Assessment in Soil Contamination Studies serves to present a sampling of the state of the art and the leading edge of research in the field. This STP was not intended to be a step by step outline of the EPA's basic rules for conducting a risk assessment, rather it represents modifications to the basic method which have been acceptable to the EPA at specific sites. Therefore, this STP complies with the EPA's written desire not to inhibit research in this area and stagnate the field.

The papers presented in this STP can be grouped into the following categories:

- background determination and statistics,
- ecological risk, and
- risk management

The papers included herein have undergone peer review and extensive revision since their original presentation and provide state of the art information on conducting risk assessments for complex sites. This collection should not be viewed as the sum total of all the method modifications suitable for risk assessment use or as a guarantee of EPA acceptance, but rather as a starting point from which the environmental professional can begin to realize the wealth of variability available in assessing health risk from a site.

Background Determination and Statistics

The determination of the background condition is fundamental to establishing if an area is contaminated. At the onset of environmental risk assessment, this function was handled by one sample or referring to a national publication. In today's risk assessments, background determinations are as sophisticated as the site characterization. As funding becomes tighter, there is pressure to reduce the amount of data used to make decisions. The use of statistical methods to determine the magnitude of differences in populations of data is becoming more sophisticated. The incorporation in the symposium and in this technical publication is indicative of the importance of the methods proposed in these papers in an environmental evaluation.

Cook presented a method to use graphic statistics to minimize the sampling needs to determine background concentrations for inorganic analytes.

Ball and Hahn used a simulated lognormal distribution to test the accuracy and stability of the statistical method recommended in Superfund guidance and in RCRA SW 846.

Ecological Risk

Assessment of the non-human receptors of environmental contamination has been the deciding parameter in many site remediations. These papers attempt to provide insight to evaluating these effects whether the non-human receptor has a human connection or not.

Burns, Cornaby, Mitz, and Hadden used probabilistic methods with ecological hazard quotients to clarify the meaning of the quotient and highlight the importance of the exposure level parameter and the effects-threshold levels.

Linder focused on wetland food chains and terrestrial food chains to illustrate an approach for the derivation and validation of trophic transfer factors for metals considered chemicals of potential concern.

Risk Management

Risk assessments are basically manipulations of the data collected from the field and analyzed in a laboratory. Once the final risks have been calculated, it is the job of risk management to determine how to minimize the risk to the exposed receptors. This can take the form of removals, engineering controls, institutional controls, or in some cases no action. It is also the responsibility of risk managers to determine if action taken to reduce risk would be more environmentally damaging or result in more chemical exposure than performing no remedial action at all.

Attoh-Okine presented a methodology to use influence diagrams to manage the environmental liability of reusing Brownfield industrial sites.

Lee and Lee discuss an alternative approach to monitoring storm water runoff that shifts the monitoring program from periodic storm water sampling to analysis of the receiving waters to determine what, if any, water quality use impairments are occurring.

Mohr and Illich outline a process to expedite risk characterization at hazardous waste sites in order to establish the basis for evaluating remedial alternatives in various environmental media.

Wang, McTernan, and Willett used Monte Carlo transport modeling to define the probability of contaminant excursions from the site, employed geostatistical simulation to evaluate existing data sets, used Bayesian modeling to define the worth of additional data, and decision modeling to define the optimum configurations.

Berman, Allen, and Van Landingham compared existing statistical methods to determine if current procedures for conducting risk assessments help to make the right decisions concerning the need for cleanup.