

Application of the Method for Environmental Risk Assessment of the EPA in an Area Contaminated by Pesticides, Organic Compounds, and Metals: Case Study

Victor Vanin Sewaybricker and *Rubens Spina* (GEOKLOCK, São Paulo, SP, Brazil)

Background/Objectives. An ecological risk assessment (ERA) is a tool that enables the decision-making process aiming at the protection of the biota within the scope of management of contaminated areas. While there is no Brazilian method in this regard, there are several international methodologies with different approaches. Methodologies developed by USEPA prescribe the development of the study in stages, based on conservative assumptions, which are improved with data that are more realistic at the end of each stage. In this study, the ERA performed in the surroundings of an industrial area contaminated by pesticides, organic compounds, and metals, where there are habitats of concern (a body of water and forest fragments), is presented.

Approach/Activities. The study comprised Stages 1 to 3A of the methodology established in the document Ecological Risk Assessment Guidance for Superfund (USEPA, 1997). In Stage 1 (formulation of the problem), ecological characterization was performed, samples of the environmental compartments of concern (topsoil, sediment, and surface water) were collected, and ecological reference standards were selected. The integration of the results of such stage supported the preparation of the conceptual ecological exposure model, with definition of habitats and ecological receptors and selection of the chemicals of ecological concern (COPEC – contaminants of potential ecological concern). In Stage 2 (assessment of potential risks), the doses of exposure to the receptors through COPEC were calculated, selecting ecological reference doses and calculating hazard quotients. In Stage 3A (improvement of the risk calculations), more realistic exposure (background, 95% of the upper confidence level (UCL) and diet composition) and toxicity (no observed adverse effect level (NOAEL), lowest observable adverse effect level (LOAEL) and maximum acceptable toxicant concentration (MATC)) assumptions were undertaken for these COPEC.

Results/Lessons Learned. The results of Stage 2 indicated potential risk for hexachlorobenzene, pesticides, and Ba, Cu, Hg, and Sb. In Stage 3A, improvement of risk calculations indicated potential risk for herbivorous and invertivorous birds associated with hexachlorobenzene and Hg contents in the topsoil. For the other COPEC and compartments contemplated by the study, the potential risks proved to be acceptable. The application of such methodology proved to be suitable for the management of a contaminated area, as it enabled the improvement of the conceptual exposure model, in order to direct the subsequent stage of toxicological (plants and worms) and chemical tests (bioavailability and Hg speciation), guiding the actions required for protection of the ecological receptors.