

OUR NEED FOR ADVANCED ANALYTICAL METHODOLOGY IN THE EVALUATION OF RISKS DUE TO SOLID WASTE INFLUENCE ON THE ENVIRONMENT

*Lennart Mathiasson
Lund University, Sweden*

ABSTRACT

In this presentation risk evaluations based on analytical methodology will be discussed for different situations. These will include the performance of present available leaching tests from EU, the possible influence of volatile gaseous pollutants from the waste on the environment, measurement of environmental pollution emanating from landfill leachate, and evaluation of the efficiencies of different methods for landfill leachate treatment.

It will be discussed how different problems lead to different demands on the analytical methodology concerning overall precision, reliability and need for detailed quantification. In this context the costs will also be discussed and cost effective measurement accomplished by utilizing analytical methods capable of measuring many substances simultaneously using automated procedures will be illustrated. The drawbacks but also some merits of using simple sum parameters will also be dealt with. The importance of proper sampling strategy will be discussed bearing in mind that the inhomogeneity of many samples in volume (i.e. solid waste) or with time (i.e. leachate from landfill) puts especial demands on the sampling procedure.

The need for a dynamic analytical protocol as the basis for measurements will be exemplified by the LAQUA protocol developed for landfill leachate. The dynamic character of the protocol will be stressed, i.e. component can be added or excluded depending on the measurement problem and as our general increasing knowledge about solid waste handling increases. For example measurements of particles containing attached endotoxins might be considered as a health problem in solid waste handling and measurements of such substances should thus be included in the protocol. Another important point to discuss in connection to an analytical protocol is the possibility to reduce the number of substances to be measured in a sample using marker substances for organic pollution and metal pollution. The goal here is to get sufficient information at acceptable costs. A conceptual discussion will also be included in this section about the possibility to combine classical analytical methodology, based on chemical characterization, with measurements using biomarkers, which might give more direct toxicity information.

The possibility to simplify analysis of complex samples, obtained in connection to solid waste handling, by using difference measurements based on relative quantities as chromatographic peak areas, will be exemplified from pilot plant measurements of different treatment steps and from full scale plants. Again the most important reason for this approach is the resulting reduction in analytical costs, which generally is the most important limitation in the search for knowledge in this area. Especially if the treatment efficiency is high, leading to concentration values in the samples far below existing threshold values, the demand on absolute values of the considered substances will decrease. In such cases semi-quantification based on quantification of one or of a few of the marker substances might be sufficient. This limited type of quantification should always be considered as necessary.