Ensuring Data and Information Comparability Using Expert Systems

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Biographical Sketches of Authors

Lawrence H. Keith has over 35 years of experience in environmental sampling and analysis including developing new methods, validating methods, and applying them to many specific projects. He also is past co-chair of the National Environmental Monitoring Index (NEMI) workgroup and contributes to the development of NEMI-CBR, a database of methods for chemical, biological, and radiological (CBR) methods. He began working with expert systems 20 years ago and is currently developing the CBR Methods Advisor for EPA's Water Security Division.

Herbert J. Brass is the Analytical Methods Team Leader in USEPA's Office of Ground Water and Drinking Water. He is the Co-Chair of the Methods and Data Comparability Board, a sub-group of the National Water Quality Monitoring Council, whose goal is to achieve comparability, so that data can be assessed across programs and organizations. He also coordinates EPA's drinking water alternative test procedure program that evaluates methods for use in compliance monitoring.

Daniel J. Sullivan is a Hydrologist with the USGS with a background in water quality and information technology for Internet applications. He is currently the co-chair and database developer for NEMI, as well as Acting Co-Chair for the Methods and Data Comparability Board. He is also the Lead Scientist for the Upper Mississippi River, Ohio, and Great Lakes River Basin Regional Synthesis Team for the National Water-Quality Assessment Program.

Abstract

An "expert system" is an interactive computer program that emulates a human expert's decision-making process in a particular domain of knowledge. Environmental monitoring programs are often complex and require detailed planning such as designing to meet specific objectives, selecting sampling and analytical methods, determining what and how many QA and QC samples are needed, determining where to sample and how many samples to analyze, deciding how to compile and manage the data and then how to assess and interpret it, and finally, how to convey results and findings. The Environmental Monitoring and Measurement Advisor (EMMA) is an expert system that provides consistent and detailed advice for designing programs and selecting methods for field and laboratory data. The latter advice draws from the National Environmental Methods Index (NEMI) and, through a cooperative research and development agreement (CRADA) with US EPA and USGS, will be linked directly to the NEMI database. The advantages of extending programming and advice from an expert system such as EMMA to the complete Water Monitoring Framework will be presented.