An Interactive Training System for Reduction in Cost and Complexity of Remediation and Long-Term Management of Contaminated Sites

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Background/Objectives. Site investigation, monitoring and management programs for complex sites are often cumbersome, over- or under-designed, and often contain unknown levels of uncertainty. In addition, the transition from active remediation to long term monitoring is a process of rationalizing and balancing cost, protection of human and ecological health, envelopes of uncertainty, and (often conflicting) stakeholder inputs. This ESTCP project was proposed as a follow-on to the SERDP-funded DIVER project (Data Information Value to Evaluate Remediation – ER-2313) which is developing technical guidance on the value of information for site investigation, remediation and monitoring programs to reduce life cycle costs for complex sites. Building upon DIVER, this ESTCP project developed a web-based interactive training tool for environmental monitoring and performance optimization (TEMPO – Training for Environmental Monitoring Performance Optimization) that incorporates training on the design and review of monitoring systems for performance assessment, site investigation approaches to optimize existing remedial systems, and monitoring programs for long term compliance.

Approach/Activities. TEMPO is a web-based application with a graphical user interface (GUI) that allows end users to undertake training on: a) the Site Investigation Training Module for improving site investigation skills; and/or, b) the Long-Term Monitoring Training Module for improving design of cost effective long term monitoring strategies and programs. Seven different virtual site datasets (VSDs) of varying complexity in geology and contaminant distribution are available in TEMPO. TEMPO allows for real-time querying of large and detailed VSD databases to output reports of simulated data at any location in the VSD. For example, as part of the site investigation module, users can "investigate" the selected virtual site by deploying an array of soil and groundwater investigation tools (i.e., boreholes, monitoring wells, MIP, analytical samples, etc.) and immediately view realistic outputs from these tools. Users can then "evaluate" their site understanding by interactively answering questions about the nature and extent of source and dissolved contaminant plumes etc. in comparison to the true, known values from the VSD simulations. Users are then able to view the results of their evaluation with a series of scoring metrics.

Results/Lessons Learned. The tool provides an interactive, realistic learning experience that supports skill development to current site management personnel as well as the next generation of contaminated site specialists (i.e., students). This training instrument is expected to have a direct positive impact on the cost to complete for complex sites.