

US EPA ARCHIVE DOCUMENT

7.0 Summary and Conclusions

Volume III describes the verification and validation activities to ensure quality of the 3MRA modeling system modules, site-based data, and chemical properties data models. This section briefly highlights the activities described in the various sections of this Volume.

The 3MRA modeling system science plan and the various science-based modules of the 3MRA modeling system were subjected to external peer reviews by national and international experts in accordance with EPA's peer review policy. All 3MRA Modeling System modules were subjected to extensive verification activities, which were documented in module-specific test plans. Any time a module failed a particular verification test, the code was corrected and the test redone until the module passed. All verification activities were completed successfully. Table 7-1 summarizes the validation efforts previously conducted on several of the modules. These modules demonstrate reasonable agreement with the field and/or laboratory data.

An extensive search for a data set was conducted to obtain appropriate multimedia environmental data to validate the 3MRA Modeling System. However, in absence of such data, a model comparison study is undertaken to compare the results of 3MRA model with those obtained using another multimedia model (TRIM). A comparison of the 3MRA model results with the multimedia monitoring data used for the TRIM comparison study are also underway. These monitoring data are limited in nature; however, they are very useful for comparison purposes in lack of a complete data-set.

The collection of the site-based data for the 3MRA modeling system representative national data set was carried out under a formal data collection plan. QA/QC protocols (including many automated checks) were followed. In addition, independent testing of major data elements was performed. All verification activities for the site-based data collection were completed successfully. Limited validation of the site-based data was performed for two sites that were in both the 3MRA modeling system representative national data set and the Surface Impoundment Study survey data set. Results were mixed. Many parameters demonstrated reasonable agreement, but some did not (particularly flows). The sample of sites compared (two) is not large enough to draw definitive conclusions.

All verification activities for the chemical properties estimation model (SPARC) and speciation of metals model (MINTEQA2) have been completed successfully for numerous contaminants. Both models continue to be updated and are re-verified whenever updates are made. Table 7-2 summarizes the outcome of validation for SPARC and MINTEQ. Both models demonstrate good agreement with data.

The 3MRA Modeling System and the modules were presented and discussed in two separate national meetings: (1) Annual meeting of the Society for Risk Analysis (SRA); (2) and

the 20th Annual Meeting of the Society for Environmental Toxicology and Chemistry (SETAC). The papers on the 3MRA methodology and the technology also are being published in professional refereed journals. A list of professional publications and presentations on the 3MRA Modeling System may be found in Appendix F.

Table 7-1. Summary of Validation of 3MRA Modeling System Modules

Module	Validated?	Outcome/Comment
Wastewater Sources (Aerated Tank and Surface Impoundment)	yes	Based on validated models (CHEMDAT8 and EPACMTP); module compares well to CHEMDAT8
Land-based Sources (Landfill, Waste Pile, and Land Application Unit) and Watershed	yes	Some parts based on empirical models (implicitly validated) Hydrology model validated using the HELP model; agreement ranged from very close to moderately large differences; in cases of large differences, comparison to data from the Water Atlas (Geraghty et al., 1973) tended to support the 3MRA results Monitored half-life data for dioxins demonstrated reasonable agreement with predicted values from the LAU Module
Air (ISCST3)	yes	Several validation studies; demonstrated reasonable agreement for both concentration and deposition
Surface Water (EXAMS)	yes	Numerous validation studies; demonstrated reasonable agreement for a variety of contaminants and settings
Vadose Zone and Aquifer (EPACMTP)	yes	Several validation studies; demonstrated reasonable agreement
SPARC	yes	Validated for all chemical properties with high correlation to observed data for numerous contaminants.
MINTEQA2	yes	Numerous validation studies demonstrate reasonable agreement with field data for a variety of contaminants.