

Nationwide USA Environmental Survey by the U.S. Environmental Protection Agency Using 3MRA

In mid-1990's, the United States was in the middle of a major national effort to clean-up hazardous waste sites. The U.S. Environmental Protection Agency (USEPA) was being pressed to define target nationwide clean-up levels for hazardous waste sites that would be protective of the environment without being overly protective.

To address these concerns EPA undertook a number of efforts to identify and evaluate potential clean-up levels. The most ambitious of these efforts was the development of a major new integrated modelling system entitled the Multimedia, Multipathway, Multireceptor Risk Assessment (3MRA) modelling system. The development and application of this system demonstrated the feasibility of using such systems to address complex national issues. The 3MRA system was released to the public in 2003.

This undertaking by EPA was a massive effort requiring the development of an integrated environmental modelling software system capable of providing probabilistic assessment of impacts across many environments for evaluation proposed actions. And once developed, the system needed to be applied to a nationwide assessment of clean-up levels for hazardous waste sites.

A 3MRA assessment starts with environmental chemical contamination (such as landfill or waste pile). Exposure profiles are used to define the potential exposure routes; up to 21,000 exposure profiles can be tracked. The release and transport of the chemical throughout the environment is simulated and associated exposures predicted. Exposure is typically evaluated by comparing with available "effects" benchmarks to assess risk (human cancer/noncancer effects, ecological population and community effects). This analysis is performed for all exposure profiles selected.

The currently available 3MRA Version 1.0 system offers 17 science-based modules that collectively simulate release, media fate and transport, foodweb dynamics, exposure, and risk associated with hazardous contaminants placed in one of five land-based waste management units.

This 3MRA software system represents a state-of-the science human and ecological exposure and risk assessment technology for contaminant waste management. 3MRA is available in the FRAMES integrated modeling platform developed by Pacific Northwest National Laboratory.

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For More Information, Please contact, Chief Scientist, PNNL, James.Droppo@pnnl.gov

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