Actionable Science for Communities

The Risk-Informed Materials Management (RIMM) Tool System for Determining Safe-Levels of Contaminated Materials Managed on the Land

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<table>
<thead>
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<th>Purpose/Utility of Research</th>
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<td>• Provides an open-source RIMM Tool System that allows users to conduct exposure and risk assessments evaluating placement of toxicant-laden materials into a wide range of environmental settings.</td>
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<td>• Facilitates Anywhere, USA auto-parameterization of its science models, allowing study of impacts across one or more sites (e.g., 1 site to 10,000 sites).</td>
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<td>• Helps assessors and decision-makers set safe material loading rates to the environment for a given decision context and set of community values</td>
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<td>• Directly supports sustainable materials management (SMM) decision analysis and decision-making at site-to-community-to-regional-to-national scales.</td>
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<th>Highlights</th>
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<td>As various communities seek to become more sustainable, they are faced with problems of choice in evaluating and analyzing the potential impacts and uses of contaminated materials as they relate to waste management systems, transportation options, land use planning, and infrastructure needs. The RIMM Tool System supports a broad range of decision-support and analysis functions for assessing exposure and risk.</td>
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RIMM: helping view ‘waste’ materials as reusable inputs to make safe products that benefit society.

EPA has responsibility under RCRA for regulating the management of hazardous waste. As part of its transition towards sustainability, EPA recognizes that some kinds of ‘waste’ materials can in fact be reused as input materials for making safe products that benefit society. The RIMM Tool System provides an integrated data-gathering and analysis technology to enable scientifically rigorous analysis of risks, benefits, and opportunities for the safe, beneficial reuse of a variety of materials that may have been considered ‘waste’ in the past. This will enable decision makers at all levels – from communities to states to the Nation – make better, science-informed decisions about waste management. Better decisions will reduce disposal costs, increase protection of public health and the environment, and reduce the use of raw materials.

RIMM Builds upon ORD’s Interoperable iemTechnologies Modeling Platform:

• Establishes the HE’RMES modeling domain in FRAMES v2.0 (Whelan et al, 2014);
• Establishes a fully implemented D4EM–HE’RMES solution (the HE’RMES Project Builder Tool), servicing all of HE’RMES’s science models for “Anywhere USA” application of the RIMM methodology; and
• Improves upon and expands on the suite of natural science models in HE’RMES. Incorporates updated hydrogeological models (EPA CMTP v2.1, 2.2), new GEM-based source-terms (Little, 2012), adds: OLEM/ORCR’s Rags-and-Wipes landfill model; and creates a new line-source Roadway source term model.

Application & Translation

RIMM Supports Applications Across Multiple Scales

FGD Gypsum National-Scale Problem: Farm Application

For a given annual unit-area loading rate for application to US farmlands, what is a safe concentration (e.g., ppm) of arsenic in FGD Gypsum resulting in:

• Human Protection – Greater than 3% of the people living within 10 miles of each farm with a risk-hazard of C or less, and
• Ecological Protection – Greater than 0% of the habitats within a 10 mile radius of each farm with an ecological hazard of F or less.

Regional-Scale Protection – For 0% of farms nationwide.

Underscoring: With confidence intervals, bounding empirical uncertainties (as a proxy for model inputs and model performance), and confidence in bounding experimental error, computational precision and user input, EPA can implement FGD Gypsum permitting science, data, and expert judgment with confidence.

Intended End Users

OLEM/ORCR Partners in Integrated Modeling:
Program Management, Communications and Analysis Office

The RIMM Tool System is intended for broad application and uses; the system is capable of serving data, and tool integration and interoperability across the source-to-outcome continuum using explicitly, naturally, and comprehensively approaches is possible. Success required monumental effort and faced many unanticipated challenges.

Lessons Learned

Achieving science, web-served data, and tool integration and interoperability across the source-to-outcome continuum using explicitly, naturally, and comprehensively approaches is possible. Success required monumental effort and faced many unanticipated challenges.

SUSTAINABLE & HEALTHY COMMUNITIES RESEARCH PROGRAM