



## RAM3 (Risk Assessment Modelling Software)

This innovative and powerful tool has been developed to assess the risk to the water environment from contaminated land.

RAM3 is a customisable, quantitative decision tool for risk based groundwater assessment and decision making in brownfield redevelopment and environmental protection, using the latest Environment Agency methodologies. Its versatility makes it a powerful tool for modelling emissions from landfills as required as part of the Environmental Permitting legislation.

### Key features

- Flexible model customisation to meet site specific requirements.
  - Multiple sources, pathway segments and receptors can be modelled.
  - Users can specify number of time slices.
  - Different sets of time slices can be used per contaminant.
- Overcomes 'black box' modelling.
- User friendly for contaminated land engineers and managers.
  - The familiar Excel environment allows standard editing and calculation facilities.
- Powerful Monte Carlo probabilistic analysis with Crystal Ball®.
- Automatic audit trail for model development and sensitivity analysis to facilitate Quality Assurance in risk assessment.
- Results are presented on scatter charts.
- Full online help.
- Compatible with Microsoft Windows XP, Vistas and 7, Microsoft Office Excel 2007 and 2010.

## Source-Pathway-Receptor Approach

Prediction of contaminant transport and fate is based on the source-pathway-receptor- approach. The software is also consistent with the principles of the ASTM RBCA (Risk Based Corrective Action) as it applies to groundwater pathways, facilitating predictions of contaminant impacts, and assessment of remedial target concentrations required to protect human health and the environment.

## Software Design

Designed using the four level Remedial Targets Methodology presented by the Environment Agency Methodology for the derivation of remedial targets for soil and groundwater to protect water resources (Environment Agency, 2006).

- Level 1 compliance point = soil zone
- Level 2 compliance point = the water table
- Level 3 compliance point = downgradient passive borehole
- Level 4 compliance point = abstraction or river

Levels 1 - 4 are preconfigured for rapid assessment in deterministic and probabilistic modes. Level 2 includes option for modelling attenuation in the unsaturated zone.

## Crystal Ball®

RAM is integrated with Crystal Ball® for probabilistic risk assessment and analysis. This Microsoft Excel add on tool from Oracle, uses Monte Carlo simulation to help analyse the risks and uncertainties associated with spreadsheet models. Relevant features include:

- Sensitivity analysis
- Correlation
- Precision control
- Distribution fitting to historical data



## Benchmarking

- On behalf of the Environment Agency ESI developed a methodology to benchmark risk assessment software tools against the modelling requirements for Tiers 1 to 3 of the Remedial Targets Methodology for assessing risk to water resources receptors from contaminated land.
- The methodology comprises four case studies of groundwater risk assessments and a series of questions to structure an analysis of the functionality and underlying assumptions/conceptual models.
- The models compared were: Environment Agency's Remedial Targets Worksheet, Golder's ConSim, GSI's RBCA Tool Kit and BP's RISC.
- RAM1 was benchmarked using the Environment Agency Methodology. The performance of RAM1 in the case studies and results of the benchmarking exercise are given in a detailed report, available [here](#).

## Pricing

- A RAM USB single seat dongle is included in the price of RAM.
- RAM3                      £650
- RAM Upgrade            2.X to 3.0 £200

## Information

RAM requires a licensed copy of Crystal Ball (version 7 or above) in order to perform probabilistic risk assessments. Please contact us for more information on Crystal Ball.

**For more information contact:**



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