

FACTSHEET

Range Environmental Vulnerability Assessment (REVA) Modeling



Introduction

The Marine Corps Range Environmental Vulnerability Assessment (REVA) program includes the use of computer models to evaluate what happens to potential contaminants in surface water and groundwater. These pathways were chosen for evaluation because they are the two primary means in which people and the environment can be exposed to munitions constituents. Scientists regularly use computer models to better understand and evaluate complex environmental systems. REVA uses modeling as a preliminary screening tool to make decisions about whether there is a chance that munitions constituents may be released from an operational range to an off-range area. These screening level models help identify high-priority sites where further investigation is needed as well as locations that are highly unlikely to present environmental issues.

Data Needs

Information required for computer modeling includes operational military munitions use specific to the range being evaluated, as well as environmental data such as soil information, drainage flow patterns, chemical parameters and geology. Both current and historic use of munitions on the ranges has been accounted for in the modeling. REVA uses modeling as a preliminary screening tool at operational range areas that are determined to be the greatest potential of concern. Priorities are developed using data on the estimated amount of munitions constituents loaded on a range over time and whether there are pathways in which these chemicals can get from loading areas to human or sensitive ecological receptors. Based on this analysis, it may not be necessary to model every operational range. In some cases, operational ranges may be grouped together for modeling purposes if they share similar characteristics, including environmental characteristics and/or military munitions use. Other ranges may be screened from the process because their environmental impact can be assessed without computer modeling.

Small arms ranges within REVA are not modeled because site-specific conditions must be known (i.e., geochemical properties) in order to model lead migration. Site-specific geochemical properties are only identified via sampling and cannot be observed physically. Without site-specific physical and chemical characterization, lead cannot effectively be modeled using fate and transport modeling like the other indicator munitions constituents (MC) in REVA. Therefore, lead is assessed through a process designed specifically to determine the potential for lead to become available to the environment and migrate off-range. The factors considered are similar to those in the modeling effort, with the addition of factors relevant to lead release, dissolution, and transport.

The data used in the models comes from a variety of sources. Installations provide environmental studies, reports, and other data on environmental conditions and type, quantity, and frequency of munitions used at each range. The environmental studies and reports may include groundwater investigations, pilot studies, drainage studies, soil and groundwater sampling reports, and other investigations. In addition, outside data sources are researched, such as region water quality control boards, Environmental Protection Agency (EPA), academic institutions, United State Geological Survey, and Natural Resource Conservation Service. The gathered data are used as input to the models to provide a full picture of the area under study.

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Surface Water and Groundwater Modeling Approaches

As mentioned above there are two potential contaminant release pathways that are modeled in REVA: groundwater and surface water. These pathways are screened separately following a similar general approach: First the data gathered is combined to create a conceptual site model that describes the pathway at the installation and identifies the data to be used in the modeling. Then the computer models, which are a series of software programs, use mathematical calculations to predict movement of the munitions constituents and potential concentrations in the groundwater or surface water. These results, the model output, are evaluated to assess if there is need for further investigation of the range or if the range does not likely present an environmental problem.

Use of Models to Screen Ranges

The REVA modeling results help decision makers in the REVA process determine whether additional assessment is warranted at a particular range. The modeling results are not intended to be a definitive answer. If the results indicate that there is a potential for munitions constituents to be migrate off-range at detectable levels in surface and/or groundwater and reach human and/or sensitive ecological receptors, then additional investigation (e.g. sampling, risk assessment, etc.) may be warranted.

Selection and Review of REVA Models

All models used in the REVA program are publicly available and approved by the EPA. They also undergo an independent, third-party review of the modeling process and all of the model input parameters. Additional details on the selection and methodology used for the REVA models are provided in Appendix F of the REVA Reference Manual (Former User Guide), which will be located on a publicly available website.

