PREFACE

THE BACKFILL AS AN ENGINEERED BARRIER FOR RADIOACTIVE WASTE MANAGEMENT

E. J. NOWAK

Sandia National Laboratories
Albuquerque, New Mexico 87185

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A backfill barrier is a component that contributes to waste isolation in a radioactive waste repository system. Backfill material occupies space between waste forms and the host rock (or liner material). Backfills can also fill access shafts and tunnels in a mined repository. A "minimum backfill" is material that has been placed around waste forms or waste containers to fill minimum clearance gaps. A "backfill barrier" is an engineered layer of tailored backfill material that may be designed to retard waste radionuclide migration as well as to fill voids that remain after waste emplacement. Backfill barriers have also been called "overpacks"; both terms are used in this group of papers.

Several facets of backfill research are critical to the optimization of backfill barrier design. Backfill materials should be selected and developed from an understanding of the chemistry of radionuclide species and their retardation or immobilization. Rates of radionuclide mass transport in backfill materials must be measured to check the adequacy of current chemical understanding. Backfill materials may also be chosen to adjust groundwater chemistry for minimum leaching and corrosion of waste forms and waste package materials. Evidence is needed to show long-term stability of backfill materials in repository environments. Finally, applied research in these areas should be guided by clear backfill performance requirements.

Critical facets of backfill research are addressed by this group of papers. Radionuclide sorption chemistry is applied to the selection of backfill materials in the paper by Beall and Allard. A paper by Wood and Coons presents the potential of basalt as a chemically reactive backfill barrier component. Measurements of radionuclide mobilities in potential backfill materials are reported by Schreiner, Fried, and Friedman. Measurements such as these are important means to assess the reliability of current chemical understanding as a predictor of backfill barrier performance. Brookins shows how geologic evidence can be used to support the long-term stability of bentonite-containing mixtures as backfill barriers. An approach to setting realistic performance requirements for backfill barriers is given by Wood. These papers bring together results from some of the diverse research areas that are critical to the best performance of backfill barriers.