

Containment Of High Level Radioactive And Hazardous Solid Wastes With Clay Barriers Spon Research

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Materials for Containment of Low-level Nuclear Waste in the Deep Ocean
Designing with Geosynthetics - 6Th Edition;
Technical Bases for Yucca Mountain Standards
Containment of High-Level Radioactive and Hazardous Solid Wastes with Clay Barriers
System of Environmental-economic Accounting 2012
Nuclear Waste Cleanup Technologies and Opportunities

Assessment of the Performance of Engineered Waste Containment Barriers

During the next several years, decisions are expected to be made in several countries on the further development and implementation of the geological disposition option. The Board on Radioactive Waste Management (BRWM) of the U.S. National Academies believes that informed and reasoned discussion of relevant scientific, engineering and social issues can-and should-play a constructive role in the decision process by providing information to decision makers on relevant technical and policy issues. A BRWM-initiated project including a workshop at Irvine, California on November 4-5, 1999, and subsequent National Academies' report to be published in spring, 2000, are intended to provide such information to national policy makers both in the U.S. and abroad. To inform national policies, it is essential that experts from the physical, geological, and

engineering sciences, and experts from the policy and social science communities work together. Some national programs have involved social science and policy experts from the beginning, while other programs have only recently recognized the importance of this collaboration. An important goal of the November workshop is to facilitate dialogue between these communities, as well as to encourage the sharing of experiences from many national programs. The workshop steering committee has prepared this discussion for participants at the workshop. It should elicit critical comments and help identify topics requiring in-depth discussion at the workshop. It is not intended as a statement of findings, conclusions, or recommendations. It is rather intended as a vehicle for stimulating dialogue among the workshop participants. Out of that dialogue will emerge the findings, conclusions, and recommendations of the National Academies' report.

Management of Low-level Radioactive Waste

INIS Atomindex

Soil is an irreplaceable resource that sustains life on the planet, challenged by food and energy demands of an increasing population. Therefore, soil contamination constitutes a critical issue to be addressed if we are to secure the life quality of present and future generations. Integrated efforts from researchers and policy makers are required to develop sound risk assessment procedures, remediation strategies and sustainable soil management policies. Environmental Risk Assessment of Soil Contamination provides a wide depiction of current research in soil contamination and risk assessment, encompassing reviews and case studies on soil pollution by heavy metals and organic pollutants. The book introduces several innovative approaches for soil remediation and risk assessment, including advances in phytoremediation and implementation of metabolomics in soil sciences.

Conditioning of Low- and Intermediate-level Radioactive Wastes

Environmental Risk Assessment of Soil Contamination

Nuclear Wastes

Focused attention by world leaders is needed to address the substantial challenges posed by disposal of spent nuclear fuel from reactors and high-level radioactive waste from processing such fuel. The biggest challenges in achieving safe and secure storage and permanent waste disposal are societal, although technical challenges remain. Disposition of radioactive wastes in a deep geological repository is a sound approach as long as it progresses through a stepwise decision-making process that takes advantage of technical advances, public participation, and international cooperation. Written for concerned citizens as well as policymakers, this book was sponsored by the U.S. Department of Energy, U.S.

Nuclear Regulatory Commission, and waste management organizations in eight other countries.

Disposition of High-Level Radioactive Waste Through Geological Isolation

Safe and Secure Transport and Storage of Radioactive Materials reviews best practice and emerging techniques in this area. The transport of radioactive materials is an essential operation in the nuclear industry, without which the generation of nuclear power would not be possible. Radioactive materials also often need to be stored pending use, treatment, or disposal. Given the nature of radioactive materials, it is paramount that transport and storage methods are both safe and secure. A vital guide for managers and general managers in the nuclear power and transport industries, this book covers topics including package design, safety, security, mechanical performance, radiation protection and shielding, thermal performance, uranium ore, fresh fuel, uranium hexafluoride, MOX, plutonium, and more. Uniquely comprehensive and systematic coverage of the packaging, transport, and storage of radioactive materials Section devoted to spent nuclear fuels Expert team of authors and editors

Low-Level Radioactive Waste Management and Disposition

Advances in Nuclear Science and Technology

During the next several years, decisions are expected to be made in several countries on the further development and implementation of the geological disposition option. The Board on Radioactive Waste Management (BRWM) of the U.S. National Academies believes that informed and reasoned discussion of relevant scientific, engineering and social issues can-and should-play a constructive role in the decision process by providing information to decision makers on relevant technical and policy issues. A BRWM-initiated project including a workshop at Irvine, California on November 4-5, 1999, and subsequent National Academies' report to be published in spring, 2000, are intended to provide such information to national policy makers both in the U.S. and abroad. To inform national policies, it is essential that experts from the physical, geological, and engineering sciences, and experts from the policy and social science communities work together. Some national programs have involved social science and policy experts from the beginning, while other programs have only recently recognized the importance of this collaboration. An important goal of the November workshop is to facilitate dialogue between these communities, as well as to encourage the sharing of experiences from many national programs. The workshop steering committee has prepared this discussion for participants at the workshop. It should elicit critical comments and help identify topics requiring in-depth discussion at the workshop. It is not intended as a statement of findings, conclusions, or recommendations. It is rather intended as a vehicle for stimulating dialogue among the workshop participants. Out of that dialogue will emerge the findings, conclusions, and recommendations of the National Academies' report.

Going the Distance?

Disposal of radioactive waste from nuclear weapons production and power generation has caused public outcry and political consternation. Nuclear Wastes presents a critical review of some waste management and disposal alternatives to the current national policy of direct disposal of light water reactor spent fuel. The book offers clearcut conclusions for what the nation should do today and what solutions should be explored for tomorrow. The committee examines the currently used "once-through" fuel cycle versus different alternatives of separations and transmutation technology systems, by which hazardous radionuclides are converted to nuclides that are either stable or radioactive with short half-lives. The volume provides detailed findings and conclusions about the status and feasibility of plutonium extraction and more advanced separations technologies, as well as three principal transmutation concepts for commercial reactor spent fuel. The book discusses nuclear proliferation; the U.S. nuclear regulatory structure; issues of health, safety and transportation; the proposed sale of electrical energy as a means of paying for the transmutation system; and other key issues.

Geologic Disposal of High-Level Radioactive Waste

Feasibility of Disposal of High-level Radioactive Waste Into the Seabed: Review of processes near a buried waste canister

Geologic Disposal of High-Level Radioactive Waste examines the fundamental knowledge and conditions to be considered and applied by planners and other professionals when establishing national repository concepts, and constructing repositories for the long-term isolation of highly radioactive waste from surrounding crystalline rock. It emphasizes the important roles of structural geology, hydrogeology, hydrochemistry, and construction techniques. It specifically examines the disposal of steel canisters with spent reactor fuel in mined repositories (MR) at medium-depth, and in very deep boreholes (VDH). While disposal in mined repositories has been widely tested, the option of placing high-level radioactive waste in deep boreholes has been considered in the US, UK, and elsewhere in Europe, but has not yet been tested on a broad scale. This book examines the possibility of safe disposal for very long periods, proposing that the high salt content and density of groundwater at large depths are such that potentially contaminated water would not rise high enough to affect the more shallow biosphere. Features: Presents the best practices for disposal of spent fuel from nuclear reactors. Assesses waste isolation capacities in short- and long-term perspectives, and the associated risks. Describes site selection principles and the economics of construction of different types of repositories. Includes an appendix which provides the latest international recommendations and guidelines concerning the disposal of highly radioactive waste.

Disposition of High-Level Radioactive Waste Through Geological Isolation

(SEEA Central Framework) is a statistical framework consisting of a comprehensive set of tables and accounts, which guides the compilation of consistent and comparable statistics and indicators for policymaking, analysis and research. It has been produced and is released under the auspices of the United Nations, the European Commission, the Food and Agriculture Organization of the United Nations, the Organisation for Economic Co-operation and Development, the International Monetary Fund and the World Bank Group"--p. iii.

Disposal of Radioactive Waste

High Level Radioactive Waste Management

High Level Radioactive Waste (HLW) Disposal, A Global Challenge presents the most recent information on proposed methods of disposal for the most dangerous radioactive waste and for assessing their function from short- and long-term perspectives. It discusses new aspects of the disposal of such waste, especially HLW. The book is unique in the literature in making it clear that, due to tectonics and long-term changes in rock structure, rock can serve only as a "mechanical support to the chemical apparatus" and that effective containment of hazardous elements can only be managed by properly designed and manufactured containers ("canisters"). This contradicts the common belief that the rock itself is an effective barrier to the transport of contaminants like radionuclides. The importance of the longevity of the containers becomes clear and requires a consideration of all degrading physical/chemical processes, which occupies a considerable part of the book. The book is thus an important contribution to the literature because it proposes design principles that can make repositories for HLW radioactive waste much safer.

Soil Contamination

Geological disposal has been internationally adopted as the most effective approach to assure the long-term, safe disposition of the used nuclear fuels and radioactive waste materials produced from nuclear power generation, nuclear weapons programs, medical, treatments, and industrial applications. Geological repository systems take advantage of natural geological barriers augmented with engineered barrier systems to isolate these radioactive materials from the environment and from future populations. Geological repository systems for safe disposal of spent nuclear fuels and radioactive waste critically reviews the state-of-the-art technologies, scientific methods, regulatory developments, and social engagement approaches directly related to the implementation of geological repository systems. Part one introduces geological disposal, including multiple-barrier geological repositories, as well as reviewing the impact of nuclear fuel recycling practices and underground research laboratory activities on the development of disposal concepts. Part two reviews geological repository siting in different host rocks, including long-term stability analysis and radionuclide transport modelling. Reviews of the range of engineered barrier systems, including waste immobilisation technologies, container materials, low pH concretes, clay-based buffer and backfill materials, and barrier performance are presented in Part

three. Part four examines total system performance assessment and safety analyses for deep geological and near-surface disposal, with coverage of uncertainty analysis, use of expert judgement for decision making, and development and use of knowledge management systems. Finally, Part five covers regulatory and social approaches for the establishment of geological disposal programs, from the development of radiation standards and risk-informed, performance-based regulations, to environmental monitoring and social engagement in the siting and operation of repositories. With its distinguished international team of contributors, Geological repository systems for safe disposal of spent nuclear fuels and radioactive waste is a standard reference for all nuclear waste management and geological repository professionals and researchers. Critically reviews the state-of-the-art technologies, scientific methods, regulatory developments, and social engagement approaches related to the implementation of geological repository systems Chapters introduce geological disposal and review the development of disposal concepts Examines long-term stability analysis, the range of engineered barrier systems and barrier performance

Low-level Radiation

Following the structure of previous editions, Volume 2 of this Sixth Edition proceeds through four individual chapters on geomembranes, geosynthetic clay liners, geofoam and geocomposites. The two volumes must accompany one another. Volume 1 contains geosynthetics, geotextiles, geogrids and geonets. The two volumes must accompany one another. All are polymeric materials used for myriad applications in geotechnical, geoenvironmental, transportation, hydraulic and private development applications. The technology has become a worldwide enterprise with approximate \$5B material sales in the 35-years since first being introduced. In addition to describing and illustrating the various materials; the most important test methods and design examples are included as pertains to specific application areas. This latest edition differs from previous ones in that sustainability is addressed throughout, new material variations are presented, new applications are included and references are updated accordingly. Each chapter includes problems for which a solutions manual is available.

Chemical Containment of Waste in the Geosphere

Geological Repository Systems for Safe Disposal of Spent Nuclear Fuels and Radioactive Waste

High Level Radioactive Waste Management

Waste regulations and programs, high-level waste

High-level Radioactive Waste Management Alternatives

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This edited book, *Soil Contamination - Current Consequences and Further Solutions*, is intended to provide an overview on the different environmental consequences of our anthropogenic activities, which has introduced a large number of xenobiotics that the soil cannot, or can only slower, decompose or degrade. We hope that this book will continue to meet the expectations and needs of all interested in diverse fields with expertise in soil science, health, toxicology, and other disciplines who contribute and share their findings to take this area forward for future investigations.

Geologic Repository for Disposal of Spent Nuclear Fuel and High-level Radioactive Waste at Yucca Mountain

President Carter's 1980 declaration of a state of emergency at Love Canal, New York, recognized that residents' health had been affected by nearby chemical waste sites. The Resource Conservation and Recovery Act, enacted in 1976, ushered in a new era of waste management disposal designed to protect the public from harm. It required that modern waste containment systems use "engineered" barriers designed to isolate hazardous and toxic wastes and prevent them from seeping into the environment. These containment systems are now employed at thousands of waste sites around the United States, and their effectiveness must be continually monitored. *Assessment of the Performance of Engineered Waste Containment Barriers* assesses the performance of waste containment barriers to date. Existing data suggest that waste containment systems with liners and covers, when constructed and maintained in accordance with current regulations, are performing well thus far. However, they have not been in existence long enough to assess long-term (postclosure) performance, which may extend for hundreds of years. The book makes recommendations on how to improve future assessments and increase confidence in predictions of barrier system performance which will be of interest to policy makers, environmental interest groups, industrial waste producers, and industrial waste management industry.

Pollutant Removal Handbook

Nuclear Decommissioning, Waste Management, and Environmental Site Remediation

A concise and current treatment of the subject of nuclear power safety, this work addresses itself to such issues of public concern as: radioactivity in routine effluents and its effect on human health and the environment, serious reactor accidents and their consequences, transportation accidents involving radioactive waste, the disposal of radioactive waste, particularly high-level wastes, and the possible theft of special nuclear materials and their fabrication into a weapon by terrorists. The implementation of the defense-in-depth concept of nuclear power safety is also discussed. Of interest to all undergraduate and graduate students of nuclear engineering, this work assumes a basic understanding of scientific and engineering principles and some familiarity with nuclear power reactors

Proceedings of the 1989 Joint International Waste Management Conference: High level radioactive waste and spent fuel management

Decommissioning nuclear facilities is a relatively new field, which has developed rapidly in the last ten years. It involves materials that may be highly radioactive and therefore require sophisticated methods of containment and remote handling. The wastes arising from decommissioning are hazardous and have to be stored or disposed of safely in order to protect the environment and future generations. Nuclear decommissioning work must be carried out to the highest possible standards to protect workers, the general public and the environment. This book describes the techniques used for dismantling redundant nuclear facilities, the safe storage of radioactive wastes and the restoration of nuclear licensed sites. * Describes the techniques used for dismantling nuclear facilities, safe storage of radioactive wastes, and the restoration of nuclear licensed facilities. * Provides the reader with decommissioning experience accumulated over 15 years by UKAEA. * Contains valuable information to personnel new to decommissioning and waste management.

High Level Radioactive Waste (HLW) Disposal

This new report from the National Research Council's Nuclear and Radiation Studies Board (NRSB) and the Transportation Research Board reviews the risks and technical and societal concerns for the transport of spent nuclear fuel and high-level radioactive waste in the United States. Shipments are expected to increase as the U.S. Department of Energy opens a repository for spent fuel and high-level waste at Yucca Mountain, and the commercial nuclear industry considers constructing a facility in Utah for temporary storage of spent fuel from some of its nuclear waste plants. The report concludes that there are no fundamental technical barriers to the safe transport of spent nuclear fuel and high-level radioactive and the radiological risks of transport are well understood and generally low. However, there are a number of challenges that must be addressed before large-quantity shipping programs can be implemented successfully. Among these are managing "social" risks. The report does not provide an examination of the security of shipments against malevolent acts but recommends that such an examination be carried out.

Nuclear Power Safety

The United States currently has no place to dispose of the high-level radioactive waste resulting from the production of the nuclear weapons and the operation of nuclear electronic power plants. The only option under formal consideration at this time is to place the waste in an underground geologic repository at Yucca Mountain in Nevada. However, there is strong public debate about whether such a repository could protect humans from the radioactive waste that will be dangerous for many thousands of years. This book shows the extent to which our scientific knowledge can guide the federal government in developing a standard to protect the health of the public from wastes in such a repository at Yucca Mountain. The U.S. Environmental Protection Agency is required to use the recommendations

presented in this book as it develops its standard.

Energy Research Abstracts

President Carter's 1980 declaration of a state of emergency at Love Canal, New York, recognized that residents' health had been affected by nearby chemical waste sites. The Resource Conservation and Recovery Act, enacted in 1976, ushered in a new era of waste management disposal designed to protect the public from harm. It required that modern waste containment systems use "engineered" barriers designed to isolate hazardous and toxic wastes and prevent them from seeping into the environment. These containment systems are now employed at thousands of waste sites around the United States, and their effectiveness must be continually monitored. *Assessment of the Performance of Engineered Waste Containment Barriers* assesses the performance of waste containment barriers to date. Existing data suggest that waste containment systems with liners and covers, when constructed and maintained in accordance with current regulations, are performing well thus far. However, they have not been in existence long enough to assess long-term (postclosure) performance, which may extend for hundreds of years. The book makes recommendations on how to improve future assessments and increase confidence in predictions of barrier system performance which will be of interest to policy makers, environmental interest groups, industrial waste producers, and industrial waste management industry.

Technical Support of Standards for High-level Radioactive Waste Management

This collection contains 178 papers on the technical and societal impacts of high-level radioactive waste presented at the Seventh Annual International Conference on High Level Radioactive Waste Management, held in Las Vegas, Nevada, April 29-May 3, 1996.

Safe and Secure Transport and Storage of Radioactive Materials

One of the largest, most complicated and expensive environmental problems in the United States is the cleanup of nuclear wastes. The US Department of Energy (DOE) has approximately 4,000 contaminated sites covering tens of thousands of acres and replete with contaminated hazardous or radioactive waste, soil, or structures. In addition to high-level waste, it has more than 250,000 cubic meters of transuranic waste and millions of cubic meters of low-level radio-active waste. In addition, DOE is responsible for thousands of facilities awaiting decontamination, decommissioning, and dismantling. DOE and its predecessors have been involved in the management of radioactive wastes since 1943, when such wastes were first generated in significant quantities as by-products of nuclear weapons production. Waste connected with DOE's nuclear weapons complex has been accumulating as a result of various operations spanning over five decades. The cost estimates for nuclear waste cleanup in the United States have been rapidly rising. It has recently been estimated to be in a range from \$200 to \$350 billion. Costs could vary

considerably based on future philosophies as to whether to isolate certain sites (the "iron fence" philosophy), or clean them up to a pristine condition (the "greenfields" philosophy). Funding will also be based on Congressional action that may reduce environmental cleanup, based on budget considerations.

Assessment of the Performance of Engineered Waste Containment Barriers

The Containment of underground nuclear explosions.

Advances in Nuclear Science and Technology, Volume 8 discusses the development of nuclear power in several countries throughout the world. This book discusses the world's largest program of land-based electricity production in the United States. Organized into six chapters, this volume begins with an overview of the phenomenon of quasi-exponential behavior by examining two mathematical models of the neutron field. This text then discusses the finite element method, which is a method for obtaining approximate solutions to integral or differential equations. Other chapters consider the status of the accuracy of nuclear data used for reactor calculations and the target accuracies required by reactor physics. This book discusses as well the role of integral experiments for the improvement of nuclear data and the different approaches taken to enhance them. The final chapter deals with the manufacture and application of coated particles. This book is a valuable resource for reactor physicists, engineers, scientists, and research workers.

Disposition of High-Level Waste and Spent Nuclear Fuel

Materials for Containment of Low-level Nuclear Waste in the Deep Ocean

The Department of Energy's Office of Environmental Management (DOE) is responsible for the safe cleanup of sites used for nuclear weapons development and government-sponsored nuclear energy research. Low-level radioactive waste (LLW) is the most volumetrically significant waste stream generated by the DOE cleanup program. LLW is also generated through commercial activities such as nuclear power plant operations and medical treatments. The laws and regulations related to the disposal of LLW in the United States have evolved over time and across agencies and states, resulting in a complex regulatory structure. DOE asked the National Academies of Sciences, Engineering, and Medicine to organize a workshop to discuss approaches for the management and disposition of LLW. Participants explored the key physical, chemical, and radiological characteristics of low-level waste that govern its safe and secure management and disposal in aggregate and in individual waste streams, and how key characteristics of low level waste are incorporated into standards, orders, and regulations that govern the management and disposal of LLW in the United States and in other major waste-producing countries. This publication summarizes the presentations and discussions from the workshop.

Designing with Geosynthetics - 6Th Edition;

One of the principal objections to or problems with the use of nuclear fuel is that a proven method for safe disposal of spent nuclear fuel has yet to be established. The central focus of most schemes underway to dispose of these high-level radioactive wastes relies on clay-based buffers and barriers to isolate spent fuel canisters in borehole

Technical Bases for Yucca Mountain Standards

Containment of High-Level Radioactive and Hazardous Solid Wastes with Clay Barriers

This text considers chemical processes within the geosphere that may be harnessed to contain a wide range of wastes. It contains contributions from experts in waste containment technologies and covers many issues such as radioactive waste management.

System of Environmental-economic Accounting 2012

Nuclear Waste Cleanup Technologies and Opportunities

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