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Handling Radioactive Wastes in the Atomic Energy Program Improving the Regulation and Management of Low-Activity Radioactive Wastes Status of Technology for Isolating High-level Radioactive Wastes in Geologic Repositories Radioactive Waste Management Radioactive Waste Management, Second Edition Disposition of High-Level Waste and Spent Nuclear Fuel Science and Technology for Disposal of Radioactive Tank Wastes Understanding Radioactive Waste Policy Options on the Generation of Radioactive Wastes in Wisconsin Radioactive Waste Management In The 21st Century End Points for Spent Nuclear Fuel and High-Level Radioactive Waste in Russia and the United States Storage of Low-level Radioactive Wastes in the Ground Improving the Characterization and Treatment of Radioactive Wastes for the Department of Energy's Accelerated Site Cleanup Program Acceptance Criteria for Disposal of Radioactive Wastes in Shallow Ground and Rock Cavities Radioactive Wastes and the Ocean Radioactive Waste Management Nuclear waste technical, schedule, and cost uncertainties of the Yucca Mountain Repository Project. An Evaluation of the Concept of Storing Radioactive Wastes in Bedrock Below the Savannah River Plant Site Nuclear Health and Safety An Introduction to Nuclear Waste Immobilisation Radioactive Waste Forms for the Future Status Report on Handling and Disposal of Radioactive Wastes in the AEC Program Going the Distance Disposal of Radioactive Wastes Hazardous and Radioactive Waste Treatment Technologies Handbook Nuclear Waste Managing the Nation's Commercial High-level Radioactive Waste Microbial Degradation Processes in Radioactive Waste Repository and in Nuclear Fuel Storage Areas Radioactive-waste Disposal in the Ocean Nuclear Waste Cleanup Technologies and Opportunities Radioactive Wastes Radioactive Waste Repository Licensing An Evaluation of the Concept of Storing Radioactive Wastes in Bedrock Below the Savannah River Plant Site The Disposal of Radioactive Wastes in the Metropolitan St. Louis Area Site Investigations for Repositories for Solid Radioactive Wastes in Deep Continental Geological Formations The Nuclear Waste Primer Radioactive Waste Management and Contaminated Site Clean-Up Radioactive Waste Nuclear Waste Management Abstracts Radioactive Waste

The Department of Energy's Office of Environmental Management (EM) directs the massive cleanup of more than 100 sites that were involved in the production of nuclear weapons materials during the Manhattan Project and the Cold War. This report offers suggestions for more effectively characterizing and treating the orphan and special-case wastes that are part of EM's accelerated cleanup program. It identifies technical opportunities for EM to improve the program that will save time and money without compromising health and safety. The opportunities identified include: making more effective use of existing facilities and capabilities for waste characterization, treatment, or disposal; eliminating self-imposed requirements that have no clear technical or safety basis; and investing in new technologies to improve existing treatment and characterization capabilities. For example, the report suggests that EM work with DOE classification officers to declassify, to the extent possible, classified materials declared as wastes. The report also suggests a new approach for treating the wastes that EM will leave in place after cleanup. This reviews sources of radioactive waste and introduces radioactive decay and radiation shielding calculations. It covers technical and regulatory aspects of waste management with discussion questions at the end of each chapter to provide an opportunity to explore the many facets of waste management issues. An extensive reference list at the end of each chapter retains the references from the first edition of the book and incorporates references used in preparing this revised text, giving readers an opportunity to look at historical records as well as current information. This reviews sources of radioactive waste and introduces radioactive decay and radiation shielding calculations. It covers technical and regulatory aspects of waste management with discussion questions at the end of each chapter to provide an opportunity to explore the many facets of waste management issues. An extensive reference list at the end of each chapter retains the references from the first edition of the book and incorporates references used in preparing this revised text, giving readers an opportunity to look at historical records as well as current information. The largest volumes of radioactive wastes in the United States contain only small amounts of radioactive material. These low-activity wastes (LAW) come from hospitals, utilities, research institutions, and defense installations where nuclear material is used. Millions of cubic feet of LAW also arise every year from non-nuclear enterprises such as mining and water treatment. While LAW

present much less of a radiation hazard than spent nuclear fuel or high-level radioactive wastes, they can cause health risks if controlled improperly. Improving the Regulation and Management of Low-Activity Radioactive Wastes asserts that LAW should be regulated and managed according to the degree of risk they pose for treatment, storage, and disposal. Current regulations are based primarily on the type of industry that produced the waste-the waste's origin-rather than its risk. In this report, a risk-informed approach for regulating and managing all types of LAW in the United States is proposed. Implemented in a gradual or stepwise fashion, this approach combines scientific risk assessment with public values and perceptions. It focuses on the hazardous properties of the waste in question and how they compare with other waste materials. The approach is based on established principles for risk-informed decision making, current risk-informed initiatives by waste regulators in the United States and abroad, solutions available under current regulatory authorities, and remedies through new legislation when necessary. New York : John Wiley and Sons, [1983]. "Provides information about nuclear waste in the United States-- what it is, where it comes from, how it has been managed, and what we can do with it in the future"--Page 1. Many books have been written on hazardous waste and nuclear waste separately, but none have combined the two subjects into one single-volume resource. Hazardous and Radioactive Waste Treatment Technologies Handbook covers the technologies, characteristics, and regulation of both hazardous chemical wastes and radioactive wastes. It provides an overview of recent waste technologies. A reference for scientists and engineers, the handbook focuses on waste-related thermal and non-thermal technologies, separation techniques, and stabilization technologies. It includes information on the DOE and DOD waste matrix located at various sites. It reveals current R&D activities in each technology and what improvements can be made in the future. A detailed schematic diagram illustrates each technology so that the process can be explicitly understood. In addition, the handbook covers relative life-cycle cost estimates for treatment systems using various technologies. With contributions from an international panel and extensively peer-reviewed, Hazardous and Radioactive Waste Treatment Technologies Handbook provides the latest information on waste remediation technologies and related regulations. Often in the field you will encounter more than one type of hazardous waste. This handbook gives you the design information you need to decide which technology to use and how to design the equipment for your particular needs. You can then incorporate appropriate technologies into a mixed waste treatment system. End Points for spent Nuclear Fuel and High-Level Radioactive Waste in Russian and the United States provides an analysis of the management of spent nuclear fuel and high-level radioactive waste in Russia and the United States, describing inventories, comparing approaches, and assessing the end-point options for storage and disposal of materials and wastes. The authoring committee finds that despite differences in philosophy about nuclear fuel cycles, Russia and the United States need similar kinds of facilities and face similar challenges, although in Russia many of the problems are worse and funding is less available. This book contains recommendations for immediate and near-term actions, for example, protecting and stabilizing materials that are security and safety hazards, actions for the longer term, such as developing more interim storage capacity and studying effects of deep injection, and areas for collaboration. Radioactive waste management and contaminated site clean-up reviews radioactive waste management processes, technologies, and international experiences. Part one explores the fundamentals of radioactive waste including sources, characterisation, and processing strategies. International safety standards, risk assessment of radioactive wastes and remediation of contaminated sites and irradiated nuclear fuel management are also reviewed. Part two highlights the current international situation across Africa, Asia, Europe, and North America. The experience in Japan, with a specific chapter on Fukushima, is also covered. Finally, part three explores the clean-up of sites contaminated by weapons programmes including the USA and former USSR. Radioactive waste management and contaminated site clean-up is a comprehensive resource for professionals, researchers, scientists and academics in radioactive waste management, governmental and other regulatory bodies and the nuclear power industry. Explores the fundamentals of radioactive waste including sources, characterisation, and processing strategies Reviews international safety standards, risk assessment of radioactive wastes and remediation of contaminated sites and irradiated nuclear fuel management Highlights the current international situation across Africa, Asia, Europe, and North America specifically including a chapter on the experience in Fukushima, Japan Purpose ofthe Workshop In the spirit of enhancing developments in science and technology by facilitating international scientific cooperation, the Science Committee of NATO is sponsoring AR W's in several selected priority areas. The objective of this workshop was to discuss what microbial mediated problems have been experienced in the area of nuclear waste management and spent fuel storage. Long term storage of high-level wastes in repositories is just starting in some countries. However, low and medium level wastes have been stored for several decades. In the area of spent fuel interim, storage has been extended at many locations far beyond the intended time. It was a priority of the workshop to examine and discuss what deleterious effects have been observed under these storage conditions or under conditions used in simulated trial tests for predicting material performance under the storage conditions. For example, one chronic problem that was discussed was possibility that microbial influenced corrosion (MIC) could be taking place in the wet storage of spent fuel thereby initiating or accelerating the process of corrosion. Another discussion in the area of waste forms, focused on the presence ofbiofilms

which may be breaking down the structure of the waste form and thereby jeopardizing its integrity. The meeting focused on discussing the observations and data collected relating to problems encountered in the storage of these types of wastes, and sharing this information with others that have not monitored their facilities for similar problems. As we enter mid-19Bl, the Reagan administration is completing a review of U. s. nuclear waste management policy. Major revisions in the recently announced Carter administration policies are expected. Reagan is a strong supporter of civilian nuclear power and will probably encourage spent fuel reprocessing by the private sector. Meanwhile, the deep geologic disposal of defense nuclear waste in New Mexico moves ahead. In the coming months, discussion and debate of U. S. radioactive waste management policies will intensify in the Congress, in the technical community, and among environ mentalists and the public at large. An important element of the debate should be the scientific and technical issues of the safe disposal of radioactive wastes from both the civilian nuclear power fuel cycle and the defense fuel cycle, including naval pro propulsion programs and nuclear weapons production. The literature of waste management is voluminous, covering all aspects of the world-wide problem of safe disposal. The authors of this book have attempted to cri tically review this literature, selecting the more important reports to abstract. Our selection criteria were heavily influenced by considerations of policy issues and by our experiences in both the technical community and the regulatory environment. Our intent is to identify those reports we feel will contribute the most to the development of a national consensus on the safe disposal of existing and future nuclear wastes as yet another U. S. waste policy emerges in Washington. This volume presents a compilation of important information on the full range of radioactive waste forms that have been developed, or at least suggested, for the incorporation of high-level nuclear waste. Many of the results were published in the ''gray literature'' of final reports of national laboratories or in various, generally less available, proceedings volumes. This is the first publication to draw information on nuclear waste forms for high-level wastes together into a single volume. Although borosilicate glass has become the standard waste form, additional research in this compound is still necessary. With improved technology (particularly processing technologies) and with a more detailed knowledge of repository conditions, glasses and second generation waste forms with improved performance properties can be developed. Sustained research programs on nuclear waste form development will yield results that can only add to public confidence and the final, safe disposal of nuclear waste. The aim of this volume is to provide a 'spring board' for these future research efforts. A detailed presentation is given on the properties and performance of non-crystalline waste forms (borosilicate glass, sintered glass, and lead-iron phosphate glass), and crystalline waste forms (Synroc, tailored ceramics, TiO 2 - ceramic matrix, glass-ceramics and FUETAP concrete). A chapter on Novel Waste Forms reviews a number of methods that warrant further development because of their potential superior performance and unique applications. The final chapter includes a tabulated comparison of important waste form properties and an extended discussion on the corrosion process and radiation damage effects for each waste form. Of particular interest is a performance assessment of nuclear waste borosilicate glass and the crystalline ceramic Synroc. This is the first detailed attempt to compare these two important waste forms on the basis of their materials properties. The discussion emphasizes the difficulties in making such a comparison and details the types of data that are required. Each chapter has been written by an expert and includes a current compilation of waste form properties with an extensive list of references. This volume will provide a stimulus for future research as well as useful reference material for scientists working in the field of nuclear waste disposal and materials science. 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. This book seeks to provide an examination of the history and consequences of the atomic legacy of St. Louis and the Metro-East by appealing to historians, WWII enthusiasts, environmentalists, as well as individuals interested in domestic and international nuclear policy. Dating back to the beginning of the OC Atomic Age, OCO 2.5 million cubic yards of radioactive wastes have been dispersed throughout the St. Louis area. This waste resulted from atomic weapons work carried out by Mallinckrodt Chemical Works for the US government under secret contract. Between 1942 and 1966, over 300,000 tons of uranium had been processed in the downtown St. Louis and Weldon Spring plants. While bits and pieces of information regarding the atomic legacy of St. Louis can be found

on a number of internet sites and in a few historical accounts of the Manhattan Project, to date there has been no comprehensive study of the secret contracting effort that made Mallinckrodt Chemical Works one of the most important contributors to the atomic bomb project. Nor has there been adequate discussion of the long-term consequences of this atomic program on the health and environment of the community." "Sidney and her friends must race to find the origin of a storm that has hit their small island home turning every animal into savage weapons"-- Radioactive wastes resulting from over 40 years of production of nuclear weapons in the U. S. are currently stored in 273 underground tanks at the U. S. Department of Energy Hanford site, Idaho National Engineering and Environmental Laboratory, Oak Ridge Reservation, and Savannah River site. Combined, tanks at these sjtes contain approximately 94,000,000 gallons of waste in a variety of forms including liquid, concrete-like salt cake, and various sludges. More than 730,000,000 curies of several radioactive isotopes are present in the underground tanks. Certainly, one of the greatest challenges facing the U. S. Department of Energy is how to characterize, retrieve, treat, and immobilize the great variety of tank wastes in a safe, timely, and cost-effective manner. For several years now, the U. S. Department of Energy has initiated and sponsored scientific and engineering studies, tests, and demonstrations to develop the myriad of technologies required to dispose of the radioactive tank wastes. In recent times, much of the Department of Energy R&D activities concerning tank wastes have been closely coordinated and organized through the Tanks Focus Area (IF A); responsibility for technical operations of the TF A has been assigned to the Pacific Northwest National Laboratory. This new report from the National Research Council (TM)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. This book recounts the issues raised and the viewpoints aired at a recent symposium on repository licensing. It summarizes the problems surrounding the setting of an Environmental Protection Agency standard for the release of radionuclides and the regulatory problems inherent in meeting such a standard. Symposium participants came from a variety of federal agencies and advisory groups, state governments, public interest groups, engineering firms, national laboratories, and foreign and international organizations. The book illustrates the strong feeling in the radioactive waste disposal community that changes must be made if the United States is to fulfill its promise of safe management of current and future nuclear waste. The safe management of radioactive wastes is of paramount importance in gaining both governmental and societal support for nuclear energy. The scope of this new textbook is to provide a comprehensive perspective on all types of radioactive wastes as to how they are created, classified, characterized, and disposed.Written to emphasize how geology and radionuclide chemistry impact waste management, this book is primarily designed for engineers who have little background in geology with low-level wastes, decommissioning wastes, high-level wastes and spent nuclear fuel.This textbook provides the most up-to-date information available on waste management in several countries. The content of this work includes transporting radioactive materials to disposal facilities. The textbook cites numerous case studies to illustrate past practices, current methodologies and to provide insights on how radioactive wastes may be managed in the future. An international perspective on waste management is also provided to help the readers better understand the diversity in approaches while highlighting what many countries have in common. Review questions for classroom use are provided at the end of each chapter. Disposal of Radioactive 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. This "objective" report, originally prepared for the U.S. Department of Energy, tells the glowing, happy story of nuclear waste disposal in America. The fourth edition has been updated to include the latest legislative and technical changes. It begins by explaining what radioactivity is and goes on to explore the merits of various methods of disposal and the use of licensing and regulation as forms of protection. Filled with graphs, tables, diagrams, and black and white photos. Annotation copyright by Book News, Inc., Portland, OR Drawing on the authors’ extensive experience in the processing and disposal of waste, An Introduction to Nuclear Waste Immobilisation, Second Edition examines the gamut of

nuclear waste issues from the natural level of radionuclides in the environment to geological disposal of waste-forms and their long-term behavior. It covers all-important aspects of processing and immobilization, including nuclear decay, regulations, new technologies and methods. Significant focus is given to the analysis of the various matrices used, especially cement and glass, with further discussion of other matrices such as bitumen. The final chapter concentrates on the performance assessment of immobilizing materials and safety of disposal, providing a full range of the resources needed to understand and correctly immobilize nuclear waste. The fully revised second edition focuses on core technologies and has an integrated approach to immobilization and hazards Each chapter focuses on a different matrix used in nuclear waste immobilization: cement, bitumen, glass and new materials Keeps the most important issues surrounding nuclear waste - such as treatment schemes and technologies and disposal - at the forefront Radioactive waste (above all highly radioactive wastes from nuclear installations) caused by research, medicine and technology must be disposed of safely. However both the strategies disputed for the disposal of radioactive waste as well as concrete proposals for choosing a location for final waste disposal are highly debatable. An appropriate disposal must conform to both complex, technical requirements and fulfill the radio-biological conditions to appropriately protect man and nature. Ethical, legal and social conditions must also be considered. An interdisciplinary team from various, relevant fields compiled the current status-quo and developed criteria and strategies, which on the one hand meet the requirements of optimal warning and prevention of risk for present and future generations, and additionally on the other hand meet the needs of what current society agrees what is expected to be allowed. This study can be understood as an advanced and continuing contribution to the corresponding scientific specialized debates, due to its interdisciplinary treatment. At the same time it serves as a fundamentally informing contribution to public and political debates, offering an easily comprehensible executive summary and precise content recommendations.