# Radioactive Waste Disposal and Geology

Konrad B. Krauskopf

TOPICS IN THE EARTH SCIENCES

VOLUME

1



# **Radioactive Waste Disposal And Geology**

**Konrad Krauskopf** 

#### **Radioactive Waste Disposal And Geology:**

Radioactive Waste Disposal and Geology Konrad Krauskopf, 1988-06-02 The perception of radioactive waste as a major problem for the industrial world has developed only recently Four decades ago the disposal of such waste was regarded as a relatively minor matter. Those were the heady days when nuclear fission seemed the answer to the world's energy needs the two wartime bombs had demonstrated its awesome power and now it was to be harnessed for the production of electricity the excavation of canals even the running of cars and airplanes In all applications of fission some waste containing radioactive elements would be generated of course but it seemed only a trivial annoyance a problem whose solution could be deferred until the more exciting challenges of constructing reactors and devising more efficient weapons had been mastered So waste accumulated some in tanks and some buried in shallow trenches These were recognized as only temporary makeshift measures because it was known that the debris would be hazardous to its surroundings for many thousands of years and hence that more permanent disposal would someday be needed. The difficulty of accomplishing this more lasting disposal only gradually became apparent The difficulty has been compounded by uncertainty about the physiological effects oflow Ievel radiation by the inadequacy of detailed knowledge about the behavior of engineered and geologic materials over long periods under unusual conditions and by the sensitization of popular fears about radiation in all its forms following widely publicized reactor accidents and leaks from waste storage sites Radioactive Waste Disposal and Geology Konrad Krauskopf, 2013-03-07 The perception of radioactive waste as a major problem for the industrial world has developed only recently Four decades ago the disposal of such waste was regarded as a relatively minor matter Those were the heady days when nuclear fission seemed the answer to the world's energy needs the two wartime bombs had demonstrated its awesome power and now it was to be harnessed for the production of electricity the excavation of canals even the running of cars and airplanes In all applications of fission some waste containing radioactive elements would be generated of course but it seemed only a trivial annoyance a problem whose solution could be deferred until the more exciting challenges of constructing reactors and devising more efficient weapons had been mastered So waste accumulated some in tanks and some buried in shallow trenches These were recognized as only temporary makeshift measures because it was known that the debris would be hazardous to its surroundings for many thousands of years and hence that more permanent disposal would someday be needed The difficulty of accomplishing this more lasting disposal only gradually became apparent The difficulty has been compounded by uncertainty about the physiological effects oflow Ievel radiation by the inadequacy of detailed knowledge about the behavior of engineered and geologic materials over long periods under unusual conditions and by the sensitization of popular fears about radiation in all its forms following widely publicized reactor accidents and leaks from waste storage sites Geological Disposal of Radioactive Wastes and Natural Analogues W. Miller, R. Alexander, N. Chapman, John C McKinley, J.A.T. Smellie, 2000-11-09 Many countries are currently exploring the option to dispose of highly

radioactive solid wastes deep underground in purpose built engineered repositories A number of surface and shallow repositories for less radioactive wastes are already in operation One of the challenges facing the nuclear industry is to demonstrate confidently that a repository will contain wastes for so long that any releases that might take place in the future will pose no significant health or environmental risk One method for building confidence in the long term future safety of a repository is to look at the physical and chemical processes which operate in natural and archaeological systems and to draw appropriate parallels with the repository For example to understand why some uranium orebodies have remained isolated underground for billions of years Such studies are called natural analogues This book investigates the concept of geological disposal and examines the wide range of natural analogues which have been studied Lessons learnt from studies of archaeological and natural systems can be used to improve our capabilities for assessing the future safety of a radioactive waste repository Geochemical Aspects of Radioactive Waste Disposal D. G. Brookins, 2012-12-06 There is an extremely voluminous literature on radioactive waste and its disposal much in the form of government sponsored research reports To wade through this mountain of literature is indeed a tedious task and it is safe to speculate that very few if any individuals have the time to examine each report that has been issued during the preceding ten years. This book attempts to summarize much of this literature Further many workers in the geosciences have not received training in the nuclear sciences and many nuclear scientists could be better versed in geology In this book an attempt is made to cover some background material on radioactive wastes and geotoxicity that may not be an integral part of a geologist s training and background material on geology and geochemistry for the nuclear scientist The geochemical material is designed for both the geoscientist and the nuclear scientist There is no specific level for this book Certainly it should be useful to advanced undergraduates and graduates studying geology and nuclear science It does not pretend to cover a tremendous amount of detail in all subjects yet the references cited provide the necessary source materials for follow up study It is my intention that the reader of this book will have a better broader understanding of the geochemical aspects of radioactive waste disposal than is otherwise available in anyone source Geology of High-Level Nuclear Waste Disposal I.S. Roxburgh, 2012-12-06 **Disposition of** High-Level Radioactive Waste Through Geological Isolation National Research Council, Division on Earth and Life Studies, Commission on Geosciences, Environment and Resources, Board on Radioactive Waste Management, 1999-10-07 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 Geological Storage of Highly Radioactive Waste

Roland Pusch, 2009-07-30 The book assesses current ideas for long term disposal of highly radioactive waste Different types of rock are discussed and assessed with respect to practical difficulties in constructing a repository and the efficiency of isolating radioactive waste Geological Disposal of Radioactive Waste Commission of the European Communities, OECD Nuclear Energy Agency. Co-ordinating Group on Geological Disposal of Radioactive Waste, 1984

Predictive Geology Ghislain De Marsily, Daniel F Merriam, 2013-10-22 Predictive Geology With Emphasis on Nuclear Waste Disposal covers the proceedings of papers presented at sessions sponsored by the International Association for Mathematical Geology The topics that this book tackles are issues relevant to nuclear waste disposal The first chapter discusses the use of plate tectonics as a catastrophe theoretic model and the second chapter covers geologic predictions and radioactive waste disposal Chapter 3 also talks about radioactive waste disposal with emphasis on the application of predictive geology Chapter 4 discusses salt domes and Chapter 5 tackles the use of fault tree analysis for probabilistic assessment of radioactive waste segregation The sixth chapter covers predictive geology in nuclear waste management while the seventh chapter tackles nuclear power on unstable ground The eighth chapter deals with long term thermohydrologic behavior of nuclear waste repositories Chapter 9 discusses the influence of faulting on groundwater flow and contaminant transport while chapter 10 covers the influence of microfissures in crystalline rock on radionuclide migration The eleventh chapter tackles the long term prediction of the fate of nuclear waste deeply buried in granite and the twelfth chapter talks about the use of quantitative evaluation of the contribution of geologic knowledge in exploration for petroleum The last chapter deals with resource estimation models and predicted discovery Researchers and professionals concerned with the effects of radioactive materials to the environment will find this book a great source of information **Geological Disposal** of Carbon Dioxide and Radioactive Waste: A Comparative Assessment Ferenc L. Toth, 2011-02-21 Fossil fuels will remain the backbone of the global energy economy for the foreseeable future. The contribution of nuclear energy to the global energy supply is also expected to increase With the pressing need to mitigate climate change and reduce greenhouse

gas emissions the fossil energy industry is exploring the possibility of carbon dioxide disposal in geological media Geological disposal has been studied for decades by the nuclear industry with a view to ensuring the safe containment of its wastes Geological disposal of carbon dioxide and that of radioactive waste gives rise to many common concerns in domains ranging from geology to public acceptance In this respect comparative assessments reveal many similarities ranging from the transformation of the geological environment and safety and monitoring concerns to regulatory liability and public acceptance issues However there are profound differences on a broad range of issues as well such as the quantities and hazardous features of the materials to be disposed of the characteristics of the targeted geological media the site engineering technologies involved and the timescales required for safe containment at the disposal location There are ample opportunities to learn from comparisons and to derive insights that will assist policymakers responsible for national energy strategies and international climate policies

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