

# Mining the Earth's Heat: Hot Dry Rock Geothermal Energy

Hot Dry Rock Geothermal Energy

Bearbeitet von  
Donald W. Brown, David V. Duchane, Grant Heiken, Vivi Thomas Hriscu

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## Preface

The hot dry rock (HDR) geothermal energy concept was born of the recognition that the heat of the earth represents an almost inexhaustible source of clean, thermal energy for mankind. It was the pioneering efforts of Bob Potter and Mort Smith, two visionary scientists at Los Alamos National Laboratory in New Mexico, that led to the development of an effective and robust method of recovering useful energy from the vast regions of hot rock in the earth's upper crust. The heat from that rock—as Smith put it—"represents the largest and most broadly distributed supply of directly usable thermal energy that is accessible to man." In the ensuing years, other researchers at Los Alamos would help to make Potter and Smith's dream a reality.

This book tells the story of the pioneering experiments at Fenton Hill, near Los Alamos, which produced the world's first and—to date—only true HDR reservoirs. They were created in deep regions of jointed basement rock that had subsequently been tightly resealed by the deposition of secondary minerals (the almost universal situation where sufficient time has followed the period of deformation that produced the jointing).

As manager of the Hot Dry Rock Project during a period that yielded some of the most fruitful and significant technical results, I was particularly well positioned for the task of analyzing and synthesizing the findings from the numerous Fenton Hill tests and experiments. Over the past twelve years, the demands of writing this book have led me to carry out an exhaustive review of those findings and to revise and/or reinterpret them as called for—in light of present knowledge concerning the behavior of deep, jointed, crystalline basement rock in general and of confined, man-made HDR reservoirs in particular.

Some readers may find the length and level of detail of certain chapters excessive. But it should be noted that this book is intended not only to provide information useful to future exploiters of heat from the deep earth, but also to serve as the complete and definitive report on the 23 years of HDR operations at Fenton Hill—written from the perspective of one who was deeply involved from start to finish. To facilitate the reader's grasp of the most important events and findings, Chapter 2 has been structured as an "Executive Summary."

Donald W. Brown  
Los Alamos, New Mexico