

Pennsylvania. Prior to joining Westinghouse in 1969, he was associated with the University of Pisa and the Italian Fast Breeder Reactor Program. Dr. Carelli serves also as adjunct faculty professor at the University of Pittsburgh, where he teaches courses in nuclear technology. He is a recognized expert in liquid-metal fast breeder reactor (LMFBR) core design and liquid-metal heat transfer and fluid flow; he has authored over 50 publications in these areas. Dr. Carelli is an active member of the American Nuclear Society and of the International Association for Hydraulic Research, where he is responsible for program activities in LMFBR core thermal hydraulics.

### Innovations in Energy: The Story of Kerr-McGee

*Author* John Samuel Ezell  
*Publisher* The University of Oklahoma Press (1979)  
*Pages* 542  
*Price* \$17.50  
*Reviewer* J. N. Anno

This well-written chronology of the birth and evolution of one of the U.S.'s great corporations is truly an excellent work. It is, and will be, an inspiration to the present and future entrepreneurs in that it dramatically illustrates that private industry can still survive and grow in a country that, it sometimes seems today, has forgotten its economic backbone. I doubt, however, that this book is of a nature to be of general interest to members of the American Nuclear Society (ANS). In the first place, the title is misleading. Most of the story, and the history of Kerr-McGee, is founded on the petroleum industry. A relatively few pages are devoted to the expansion into other natural energy resources such as uranium. While the reviewer personally feels that the world, and especially the U.S., needs every bit of energy resource it can develop, ANS members could probably more profitably spend their reading hours in the technical journals. With this introduction, let me attempt to summarize this otherwise interesting book of approximately 500 pages in one much oversimplified paragraph.

Beginning in 1929 in Ada, Oklahoma, with the formation of the Anderson & Kerr Drilling Company, after years of struggling and with the genius, hard work, and some good fortune of its founders and employees, the Kerr-McGee Corporation reached the full attention of the general public in its pioneering efforts in the offshore oil industry (first offshore oil well successfully drilled out of sight of land in 1947). The corporation prospered, weathered the recession years of 1958 and 1959, and expanded into even more natural resource efforts. For example, in 1964, its uranium holdings were the largest in the country, and it owned the first private helium refinery. It had even spread into the fertilizer area. Nevertheless, petroleum remained and still remains the backbone of what had been termed by 1974 the "nation's most major independent oil company." Aside from mention of the nowadays seemingly common litigation and lawsuits survived

by the corporation almost since its inception, at the conclusion of the story (1977) one is left with the feeling that Kerr-McGee is a corporation whose officers have dared to make some bold decisions—to take the risks—and have received handsome rewards, not only for the stockholders and employees, but for the economic benefit of the citizens of the U.S.

*Dr. J. N. Anno is a professor of nuclear engineering at the University of Cincinnati and president of Research Dynamics Incorporated, a small research and development corporation. He has spent over 25 years in research and development activities, much of that in energy-related areas. From 1953 to 1970, he was employed by Battelle Memorial Institute, Columbus, Ohio, where he was engaged in primarily nuclear-oriented research. He is the co-inventor on four U.S. patents concerning a novel heat engine, and currently is active in materials research and production for fusion reactor blankets. Dr. Anno received his doctorate degree in physics in 1965 from the Ohio State University, and joined the nuclear engineering faculty at the University of Cincinnati in 1970.*

### Use of Argillaceous Materials for the Isolation of Radioactive Waste

(Proceedings of the NEA Workshop held in Paris, September 10–12, 1979)

*Publisher* Organization for Economic Cooperation and Development (1980)  
*Pages* 281  
*Reviewer* Raymond L. Murray

A reader who is interested in waste disposal but is weak in geology would do well to look up a few words in a dictionary before tackling this book. He will find that "argillaceous" refers to clay that is composed mainly of aluminum silicate and is used especially for brick, tile, and pottery. Shale is described as a compacted laminated clay. Bentonite, frequently mentioned as a barrier between metal waste canisters and a geologic medium, is defined as an especially absorptive type of clay. Perusal of the Foreword of the book reveals that argillaceous materials have low permeability and high sorption capacity, properties favorable for host media in the disposal of high-level nuclear wastes.

The collection of papers describes research and development progress and plans in several countries—the U.K., France, Italy, Sweden, and especially the U.S. Subjects reported on include heat transmission, mass transport, with emphasis on the migration of radionuclides, and geochemical properties such as composition, porosity, and thermal stability. Reports cover laboratory work, literature investigation, mathematical analysis, field studies, and designs of waste repositories. Although many data are being collected and analyzed, one gets the impression that much more remains to be done on this type of geological medium. This is understandable since most previous research and development was on salt and recent alternative studies have favored basalt and granite.

The number of participants was unusually small—29—but it appears that a great deal of useful information was exchanged among active workers in the field. Nineteen of the papers are in English and two are in French. It was amusing to note that throughout the discussions, questions in French were answered in English and vice versa. I wondered how many participants were bilingual. A lively and apparently fruitful panel discussion was held at the end of the conference.

Readers may recall the map of argillaceous deposits in the U.S. in the American Physical Society's study of waste disposal [*Rev. Mod. Phys.* (Jan. 1978)]. With such a large amount of shale and clay available, continuing inves-

tigations of these media would seem to be well worthwhile. The information is certainly timely in view of the keen international interest in the waste problem, and the editors and publishers are to be congratulated on getting the proceedings out so quickly.

*Raymond L. Murray is best known for his teaching and writing in the nuclear engineering program at North Carolina State University, from which he has just retired after 30 years. Dr. Murray plans to continue to write, consult, and travel. He is the 1970 recipient of the Arthur Holly Compton Award of the American Nuclear Society.*