worked at The Detroit Edison Company on early studies for the Enrico Fermi Fast Breeder Reactor, and still serves on the PRDC Technical and Engineering Committee. In 1964 he was instrumental in organizing the ANS Technical Group for Power, and as the first chairman, saw it through to its present status as the ANS Power Division. Mr. Pandorf also serves his company as a specialist on codes and standards and, among many assignments in this field, is the current chairman of USA Standard B31 Code for Pressure Piping. He is a Fellow of ASME and Vice-President of the Ohio Society of Professional Engineers.

FUTURE RESEARCH REACTORS

Title Research Applications of Nuclear Pulsed Systems

Author IAEA

Publisher Natl Agcy for Intl Publ Inc., 1967

Pages 234 pp, 134 figs

Price $5.00

Reviewer Robert E. Chrien

It was fitting that a panel meeting on the research applications of repetitively pulsed neutron sources was held at Dubna, U.S.S.R. in July, 1966. At Dubna the Russians built the world's first (and to date, only) repetitively pulsed reactor, and organized an imaginative and impressive research program which has been operative since 1961.

A book comprised of papers presented at this panel meeting, *Research Applications of Nuclear Pulsed Systems*, has been issued by the IAEA. It is especially timely since several proposals to build high intensity pulsed sources are currently being considered in the United States, Canada, and Europe. Eighteen papers covering various topics are included. These cover possible applications of time-of-flight methods to the study of the static and dynamic properties of solid and liquid structures, and to nuclear physics. Proposed facilities such as the SORA reactor at Ispra, the Canadian Intense Neutron Generator, and the Harwell Super Booster are also described. Neutron time-of-flight studies at Dubna and at various other installations are covered.

As might be anticipated, the collection is notable for unevenness in quality and redundancy of material. Like many such books, the material is of interest mainly to the specialist. Within these limitations, it forms a valuable source for time-of-flight methods, particularly as applied to solid-state problems. Several of the papers present excellent summaries of this specialized area; the paper of R. M. Brugger on "Neutron Diffraction Studies of Samples at High Pressures," and that of P. A. Egelstaff on "Pulsed Neutron Sources in Solid and Liquid State Physics," in particular, are well written. Redundancy is sometimes a virtue; for example, the discussion of Buras's work on diffraction studies by time-of-flight is presented much more clearly in Brugger's paper than it is in Buras's own paper.

Professor I. M. Frank presents an impressive account of the research program at the Dubna pulsed reactor. Especially notable is the Russian work on resonance (n, α) reactions, and polarized neutron reaction studies. The balance of the papers presented by the U.S.S.R. delegation is less notable. One wonders why the general level of Russian report writing is not better; the diagrams and figures are uniformly poor.

On the whole, the book makes a convincing case for the usefulness of pulsed-neutron sources in solid-state physics. The continuous reactors are clearly approaching their limit as intense neutron sources, and the next generation of research instruments will no doubt be pulsed systems. This book is a valuable reference for those specialists who will be working in this field.

Robert E. Chrien is a research physicist at Brookhaven National Laboratory. As a graduate of Rensselaer Polytechnic Institute and Case Institute of Technology, he came to BNL in 1957 to work with the late Donald J. Hughes. He has been active in the measurement of total neutron cross sections, resonance parameters, and more recently, in the study of neutron-capture gamma rays in the resonance region. A pioneer in the use of on-line computers in neutron physics, he, R. Spinrad, and S. Rankowitz designed the first time-shared, on-line computer system for nuclear physics applications.

NEOTERIC OLD FRIEND

Title Sourcebook on Atomic Energy

Author Samuel Glasstone

Publisher D. Van Nostrand Company, Inc., 1967

Pages v + 883

Price $9.25

Edition Third

Reviewer Marvin H. Wilkening

This third edition of Dr. Glasstone's monumental work will be welcomed by its old friends because of the updating on the sections on nuclear structure, nuclear reactors, controlled fusion, cosmic rays, and the synthetic elements, plus a new chapter on elementary particles. At a time when power production from nuclear reactors is expanding rapidly, and the whole field of nuclear applications is receiving new impetus in such widely varying areas as industry, medicine, biology, agriculture, law enforcement, archeology, and cosmology, this edition that treats advances in all of these fields is especially appropriate. The addition of a list of books and articles for further reading at the end of each chapter will greatly enhance the value of the book to the student and to the research scholar outside of atomic and nuclear science.

Although the new edition has been expanded considerably,—883 pages compared with 546 pages in the first edition,—the organization of the subject matter remains essentially the same. The first five chapters constitute a delightful compilation of the history of atomic theory beginning with origin of the atomic concept by Leucippus in the 5th century, B.C. and continuing through that golden era of atomic discovery from the early 1890's to the beginning of World War I. This part of the book

is a real treasure for the college teacher looking for the historical development of atomic and nuclear science. The lower division student in chemistry or physics will find these chapters easy reading and interesting. Frederick Soddy, an English chemist working with Rutherford in the discovery of radioactive elements, wrote in his book *Radioactivity* in 1904, "The discovery of radioactivity has proved to be the beginning of a new science, in the development of which physics and chemistry have worked together in harmony." Soddy would be proud indeed of Dr. Glasstone's skillful blending of the contributions of chemists and physicists in these pages.

The mid-section of the book plus the last two chapters on cosmic rays and elementary particles treat subject matter normally encountered by a physics major at the junior level. There is not a very high degree of mathematical sophistication here since Dr. Glasstone is keeping the lay reader in mind throughout. Isotopes, nuclear radiations and their measurement, accelerators, nuclear reactions, nuclear forces, and fission are all given due emphasis. The historical treatment is continued, but depth in the descriptive sense is not sacrificed. For example, in the chapter on the detection and measurement of radiation, the reader learns how the ionization chambers of Madame Curie and Ernest Rutherford worked, as well as how modern computers are used in the "kinematic analysis" of particle tracks in a bubble or spark chamber. Glasstone ends where the current papers by physicists working in the esoteric field of elementary particle physics begin: conservation laws, symmetries, quarks, and the dynamics of strong interactions. The reader can get a passing acquaintance with this subject matter, but he must face the hazard that "a little bit of knowledge is a dangerous thing."

For a large segment of today's scientists, engineers, and technologists, the most important section of the *Sourcebook* is the third part that discusses nuclear energy, reactors, the synthetic elements, the use of isotopes and radiation, and biological effects and radiation. Dr. Glasstone's long association with the developments in these areas, the resources available to him through the U.S. Atomic Energy Commission, and his skill at ferreting out and emphasizing those things of current and future importance make this part of the book a worthy volume in itself. A utilities president, a resource economist, a medical doctor, a space scientist, an agriculturist, an arid lands expert, a new-products engineer, and many more can each learn new things of value in his speciality, and at the same time can see the overall impact of atomic energy on our society.

In spite of its many virtues, the *Sourcebook on Atomic Energy* cannot be "all things to all people." The specialist will regret the inevitable shallowness of treatment in his area of interest; those not used to the previous editions will find the numbered paragraphs annoying; definitions and other "gems" of information are frequently found only in the footnotes, a style that dates the book from another period. The remarkable resources available to the author and the publishers have not succeeded completely in eradicating misspelled words and misplaced emphasis in explanations of basic physical concepts. However, these are minor points and do not detract from what is altogether an extraordinary volume.

Marvin H. Wilkening is Dean of Graduate Studies and Head of the Department of Physics and Geophysics at the New Mexico Institute of Mining and Technology in Socorro, New Mexico. His MS and PhD degrees are in physics from the Illinois Institute of Technology. During World War II while a member of the Army's Manhattan Project, he was stationed first at Chicago, where he participated in the startup of the first nuclear reactor on December 2, 1942, and later at Oak Ridge, Richland, and Los Alamos. While at Los Alamos, he was one of the small group of scientists who carried out the first atom-bomb test on the desert some 35 miles southeast of Socorro. His present research is concerned with atmospheric electricity and natural radioactivity in the atmosphere.