Volume I finally leaves uranium dioxide and presents some fine data on the fabrication of beryllia powder into pieces by sintering, but continues to bring uranium dioxide back into focus, leaving very little doubt as to the most important fuel material in use today.

The carbides are given a fair coverage and the nitrides a very brief run down. The work presented seems quite informative and of much interest to those working in these technologies.

To summarize, Volume I has a wealth of very practical fabrication and handling technology on uranium dioxide. It cannot help but be a good source book of techniques and ideas for those intimately concerned with uranium dioxide fabrication technology. It will be a disappointment to most who approach a subject primarily from a theoretical standpoint for there is really very little (although some) theoretical treatment of the whole subject of sintering and fabrication.

Volume II leaves the technology field to some extent and presents some data on irradiation behavior and analysis of a special nature.

The thermal conductivity of uranium dioxide is again explored by J. A. L. Robertson with the continuing discussion of what constitutes melting in uranium dioxide. This is always interesting and provocative and Robertson's article is well done. He helps solidify the strong position of UO_2.

Dispersion fuels come in for a few articles but it would seem that except for special applications, dispersion fuels are not going to compete with sintered uranium dioxide for very long. The article on the fabrication of stainless-steel UO_2-fuel plates is very well written and full of some very interesting observations and data.

The French work on the thermal conductivity of UO_2 is rich in experimental techniques and in results. This work is discussed at length and really poses an interesting problem because the results are so much lower than those of Hanford and Chalk River.

Volume II is of a significantly different scope than Volume I. In Volume I, the emphasis is on the manipulation of uranium dioxide, whereas in Volume II, it is hard to define what the true scope is supposed to be. Of the two volumes, Volume I most appealed to the reviewer because it dealt with work closer to his interest. Volume II will probably be of similar import for workers in the field of irradiation performance, thermal conductivity of uranium dioxide and cermet technology.

In summary, the volumes contain a wealth of practical technology and reports on work carried out in the last few years. It is obvious that not all of the reported work is the very latest, but it does summarize some of the more solidified processes of Europe and to some extent the U. S. The reviewer has had two occasions in the short time the volumes have been in his possession to use the material as conference table references to support development ideas and discussions. Each time the material was scanned for review purposes a new article came under close scrutiny and this promises to continue for some time in the future. The volumes belong on the shelf of any industrial organization concerned with the technology of uranium, especially uranium dioxide.

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About the Reviewer: William R. DeHollander is a specialist in Nuclear Fuels and Materials at the General Electric Company's Atomic Power Equipment Department where he has been since 1959. Prior to this, he was at the Hanford Works. Dr. DeHollander received his Ph.D. degree in Physical Chemistry from the University of Washington in 1951. He has been in the nuclear field since that time.

Laboratory Training Manual on the Use of Isotopes and Radiation in Soil-Plant Relations Research. International Atomic Energy Agency—Technical Report Series No. 29 (165 pages). Available from National Agency for International Publications, Inc., 317 East 34th Street, New York, N. Y. 10016. 165 pages. $3.50.

This volume is a joint undertaking of the IAEA and the FAO and is a very compact treatment of radiation and radioactivity techniques.

The manual is an outgrowth of a series of courses given by the United Nations Expanded Program of Technical Assistance. A number of instructors have participated in the courses but the present volume was developed by Victor Middleboe and a panel of scientists meeting in Vienna in 1962. A large number of workers in the field have contributed to the manual although no specific credit is given either to the writers of particular sections or to the sources of the lecture material or the laboratory experiments.

The book is divided into a basic part and an applied part, with each section being subdivided into introductory material and laboratory exercises. The lecture material in the basic part is an excellent summary of the standard lecture material included in most courses. Radioactive decay, interaction of radiation with matter, radiation detection, and health physics are included in the first thirty pages or so. The next twenty pages

include good summary discussions of the basic principles of isotope applications, including isotope dilution, tracer kinetics and activation analysis. The treatment is not extensive but touches on the major factors in these areas. The introductory material for the applied part discusses the problems of radioisotope work, including statements regarding chemical effects, isotope effects, etc.

The laboratory exercises include standard experiments on GM counters, scintillation counting, liquid scintillation, combustion of carbon compounds, exchange kinetics and various analytical techniques. The book is particularly distinguished by the soil-plant experiments comprising the last fifty pages. These are quite good and represent a distinct contribution to relatively simple but practical experiments. These include experiments such as adsorption of phosphate in soils, adsorption of cations, the fixation of CO_2 and separation of photosynthates by paper chromatography, CO_2 fixation of the higher plants, autoradiography, uptake of ions by plants, the effect of placement of fertilizers, and radiation damage.

Four appendices are included (located between the two major sections of the book). These include a somewhat abridged table of maximum permissible concentrations, how to put on and take off rubber gloves, radioactive waste control, and criteria of optimum operating conditions for a proportional counter. A bibliography of 11 volumes is included following these appendices. Unfortunately, essentially no references are given to the sources of specific procedures. An interesting selection of 'mental exercises' is given which represent typical laboratory problems.

This book is certainly to be recommended to those who work with radioisotopes in agricultural problems and particularly to those who are responsible for teaching courses in this area. It is a very useful addition to the growing collection of valuable materials available from the Agency.

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About the Reviewer: As former Chairman of the Special Training Division of the Oak Ridge Institute of Nuclear Studies, Dr. Ralph T. Overman has probably taught more people about uses of isotopes than anyone else. He had advised groups from Japan to Lebanon about setting up schools for isotopic use training. He is a Fellow of ANS and a member of our Editorial Advisory Committee.

He recently opened his own consulting office in Oak Ridge.

Solid State Charged Particle Detectors. By Niels J. Hansen. Pergamon Press, New York, 72 pages. $4.25.

This book presents in a short but complete form all the basic information necessary to the user of solid-state radiation detectors.

A quick review of the principal types of radiation detectors in current use (ionization chambers, scintillation counters, etc.) is given in the introduction, to place the solid-state detectors in their proper context.

The basic principles of solid-state theory, necessary for the understanding of the operation of the detectors, are discussed in the first two chapters. A very clear picture is given of the Single Electron Theory of Metals and the Band Theory of Solids. The author completely succeeds in giving a concise explanation of the more fundamental concepts involved without sacrificing rigor or accuracy.

The third chapter studies the structure of the different types of solid-state detectors available at present and establishes the fundamental relationships between detector parameters: resistivity, capacitance, depletion depth and applied bias. Drifted detectors are separately treated at the end of the chapter.

The mechanisms of interaction of charged particles with matter is briefly discussed in the fourth chapter of the book.

With considerably more detail, the operation of solid-state detectors is analyzed in chapter five. This chapter has three parts: Part A deals with junction detectors and Part B with drifted detectors. In both cases the processes involved in the collection of charge are studied, and the influence of the reduced range β_0 on the pulse shape is shown. Part C is a general discussion of the operation of the different types of detectors previously studied.

Only the most relevant information about the associated electronics is presented in chapter six.

The importance of the concepts of charge equivalent noise, charge-sensitive-amplifier configuration, and the influence of pulse shaping on signal-to-noise ratio is stressed and discussed with greater detail in chapter seven. Here, the contribution to the width of the peaks due to phenomena taking place in the detector itself and to noise generated in the following amplifying system is considered with some detail.

Finally, chapter eight deals with the applications of solid-state counters in Nuclear Spectrometry. The advantages and limitations of Junction and Drifted devices when used as spectrometers for electrons or heavier particles are shown, and a special consideration is given to the use of