Electric Co., and he has participated in AEC-DRL meetings on the project. He performed similar functions for the Bailly Generating Station Nuclear-1 of Northern Indiana Public Service Co., and was responsible for the writing and editing of the La Salle County Station PSAR for Commonwealth Edison Co. He is presently the project licensing engineer for the Illinois Power Co. Clinton Power Station. Prior to joining Sargent & Lundy's Nuclear Licensing Division, he worked in Sargent & Lundy's Nuclear Analytical Division and performed the preliminary design on Commonwealth Edison Company's Zion Station containment spray system. He was directly involved in the writing of the preliminary site studies for four utilities. He also worked on the preparation of the atmospheric dispersion code WINBAG, used in reactor accident analyses, and wrote many of the pre-operational test procedures for balance-of-plant systems for the Fort St. Vrain HTGR. He is a member of the American Nuclear Society and is on the ANSI-N101.5 (Protective Coatings for Light Water Nuclear Reactor Containment Facilities) Committee.

Rapid Methods For Measuring Radioactivity in the Environment
(Proceedings of an International Symposium, Neuherberg, 1971)

Editor	IAEA
Publisher	Unipub, Inc. (1971)
Pages	967
Price	$25.00
Reviewer	Abraham Goldin

The 967 pages of this volume report the discussions of almost 200 scientists in a five-day symposium held July 1971 on the subject of Rapid Methods for the Measurement of Radioactivity in the Environment. As might be expected, a tremendous amount of information is presented. As might also be expected, the book does not form a coherent whole; it remains essentially 76 separate and somewhat isolated papers.

In addition to papers on chemical and instrumental laboratory methods and on field methods, the book contains chapters on basic considerations, normal and emergency surveillance, data evaluation, and future developments. The directions in which environmental measurements are going can be seen by summarizing the subjects of the papers. Six described monitoring programs in existence, seven described plans, usually for emergency monitoring, four were on sampling programs or techniques, and one was on intercomparisons. In instrumental techniques, most attention was paid to Ge(Li) gamma spectrometry (seven papers) and to beta spectrometry (five papers). There were four papers on portable multichannel analyzers, two papers primarily on sodium iodide gamma spectrometry, and one each on alpha spectrometry and fission track counting. In chemical techniques, there were two papers on carrier methods, and one paper each on gas chromatography, paper electromigration, automatic analysis, sub-stoichiometric solvent extraction, dry ashing, and wet ashing. The most popular radioelements were plutonium, strontium, and ^{85}Kr, with two papers each, while single authors wrote on ruthenium, tritium, and ^{14}C.

It is obviously not possible to review in any detail the papers in this volume. The diversity of topics is matched by a diversity in quality, from some which are better than most papers appearing in journals to some which are mere rehashes of conventional procedures. Each reader may select those papers which present material new and useful to him. Some general points may be noted. Lack of agreement on the meaning or the purpose of a rapid method was apparent. Several authors considered rapid methods in the context of accidental release of radioactivity with the purpose of providing quick information for protection of the public; others dealt with rapid methods in the context of routine monitoring. This dichotomy was especially apparent in the papers on Basic Considerations, where Bryant and Macdonald considered the accident situation while Harley spoke of rapid methods in routine surveillance, with special emphasis on limiting cost and effort. Both Harley and Morgan were influenced by the proposed reduction in reactor effluent discharges to a dose equivalent level of 5 mrem/yr, which was of less concern to non-American authors. American authors also generally contemplated much more extensive monitoring programs than European authors, probably a reflection of differences in regulatory attitudes.

A few papers which struck me as particularly interesting may be mentioned. (The reader should bear in mind that the reviewer's preferences reflect the fact that he is a chemist.) Sansoni presented a wet-ashing technique using free OH radicals produced by the catalytic action of Fe^{++} ions on hydrogen peroxide. Samples from 100 to 1000 g are dissolved in a few hours. Charrier described separation of xenon, krypton, and argon by gas chromatography. Natural alpha emitters were separated by Iwata in 3 min, using electromigration on paper. Detection was by NaOH-etched alpha tracks in celluloid. Two novel sampling techniques were presented. Hiyama fits a biological cap containing mussels and/or algae to a scintillation counter suspended beneath a water surface. Concentration of nuclides by the organism provides increased sensitivity, and minor fluctuations are smoothed. Garland described a fabric coated with non-drying resin for air monitoring around a facility. These "tacky lamp shades" are directional and can be used in at least a semi-quantitative manner. On at least two occasions these fabric collectors detected radioactivity releases which were too small to affect herbage or milk samples. Maruyama used multichannel beta spectrometry with coincidence background suppression for low level samples.

A reviewer has the privilege of airing at least one complaint about a volume. The one I have chosen is the lack of information in many of the abstracts, a fault unfortunately quite common in symposium proceedings. Several of the French and German papers contained very interesting material not even hinted at in the abstracts. One abstract of a Russian paper says simply that the paper describes measurement methods and simple equipment for rapid determination of the isotopic composition of gases and aerosols. It can be ascertained from the figures in the paper that gamma spectroscopy with sodium iodide is involved, but nothing is mentioned about the procedure. How is a reader to decide whether or not he would like to have a translation?

Finally we come to the moment of truth. How good is this book and can it be recommended? My own judgment is that I would like to have it available in a library but would not feel I needed it for my own bookshelves.

Abraham S. Goldin, associate professor of environmental chemistry at the Harvard School of Public Health, has been an active worker in the determination of radioactive materials for over 20 years. A chemist by training, he has developed both chemical and instrumental methods for radionuclides, with particular emphasis on determinations at environmental levels. Methods for the determination of radium, of strontium isotopes, and for the gamma spectrometric radioassay of milk were developed under his direction. For several years, he was in charge of quality assurance for Public Health Service national networks determining radionuclides in milk and foods.

Spent Nuclear Fuel Transfer: Fuel Casks and Transfer Operations

Editor	D. J. Groetch
Publisher	American Society of Mechanical Engineers
Pages	44
Price	$6.00
Reviewer	Robert Doda

This publication is a compilation of papers presented at a Symposium of the same name held at the Winter 1971 Meeting of the American Society of Mechanical Engineers. It is an attempt to summarize current solutions to the cask design problem and to the attendant fuel thermal analysis problem. The net effect has a surprisingly good coherence and yields good background data.

The information presented should appeal to those who are involved with nuclear fuel cask design and with the regulations which affect this design. The general cask design problem is defined with respect to the controlling regulations, 49 CFR, Parts 171 to 178, and 10 CFR, Part 71. The hypothetical accident conditions which the cask design must successfully meet, are treated from a state-of-the-art standpoint and with a lack of comprehensiveness indicative of the shallow background of experimental data. Designs for various fuel assemblies are included along with a smattering of fuel thermal analyses. These papers do emphasize thoroughly the importance of finding new design methods and of obtaining experimental data in order to reduce the great conservatism which is now prevalent in these designs.

A single paper, only somewhat related, is presented on the handling and cooling of fuel subassemblies for the EBR-II reactor. Heat transfer characteristics and experimental procedures are well described, and special problem areas are indicated. The EBR-II presentation is very well done, making for an interesting report.

Robert J. Doda (BS, chemical engineering, University of North Dakota, 1955; MS, nuclear engineering, University of Arizona, 1963) is a nuclear engineer and is general manager of American Atomics Corporation. Since 1964, he has been involved with the application and development of radioisotopes in various fields and in developing specialized hardware and techniques for prototype and production manufacture of radioisotopic devices. Gaseous radioactive handling systems, and shipment and containment of gaseous isotopes have been of primary interest. He has worked extensively with regulatory agencies concerning licensing and transportation of radioisotopes.

The Radiation Chemistry of Water

Authors:	Ivan G. Draganic and Zorica D. Draganic
Publisher:	Academic Press (1971)
Pages:	244
Price:	$14.00
Reviewer:	Sheffield Gordon

During the period covered by the "Manhattan Project," the study of the radiation chemistry of water received an enormous stimulus from the interest of nuclear engineers and physicists in the use of water in cooling systems and moderators of nuclear reactors. This stimulus resulted in widespread activity in this field throughout the world, and in 1961 progress in this area was summarized in A. O. Allen's monograph *Radiation Chemistry of Water and Aqueous Solutions*. Since the appearance of Allen's book, the advent of pulse radiolysis together with the development of sophisticated fast reaction techniques inaugurated a new chapter in the history of this subject. Use of this technique led to the discovery of numerous reaction intermediates in irradiated water and aqueous solutions. A notable example of these was the discovery of the absorption spectrum of the hydrated electron.

The appearance of this volume by Draganic and Draganic is a welcome successor to the Allen monograph. The book begins with an excellent historical survey of the radiation chemistry of water. The authors then treat the interaction of ionizing radiation with water, covering the physics of the absorption process and then going into a discussion of the origin of the resulting short-lived species which cause chemical change in irradiated water.

One chapter is devoted to the short-lived reducing species, namely the hydrated electron and the hydrogen atom as well as the primary molecular hydrogen formation. Another chapter treats the primary oxidizing species, the OH radical, and the primary hydrogen peroxide. Both of these chapters give good summaries of the yields and rate constants of these species with various solutes, including numerous references to the literature. In addition to comparing the yields of primary products in H_2O and D_2O, another chapter is devoted to a more detailed discussion of the radiation chemical yield of the primary products of water radiolysis and the dependence of these yields on ion track density (LET), concentration of solute, pH, dose rate temperature, and pressure. There is an excellent chapter on diffusion-kinetic model calculations as applied to the reactions of the primary species. The final chapter is devoted to a short summary of the important experimental technique used in aqueous radiation chemistry.