BOOK REVIEWS

Selection of books for review is based on the editors opinions regarding possible reader interest and on the availability of the book to the editors. Occasional selections may include books on topics somewhat peripheral to the subject matter ordinarily considered acceptable.

Peaceful Uses of Atomic Energy

(Proceedings of the Fourth International Conference, Geneva, September 1971)

Editor	IAEA
Publisher	Unipub, Inc. (1972)
Pages	479
Price	$14.00
Reviewer	Orest A. Hrynewych

Volume 3 of the Proceedings of the Fourth International Conference on the Peaceful Uses of Atomic Energy contains the texts of 32 papers presented at the Proceedings. Twenty-six are related to some facet of safety of nuclear power plants, and six deal with a wide range of topics—under the general title of legal aspects of nuclear energy. The majority of the papers (24) are in English; six papers are in French; one is in Russian; and one is in Spanish. This volume is of greatest interest to people who deal with any aspect of nuclear licensing, but more specifically with plant design criteria, accident analysis, and siting. These three topics are well covered by a range of papers. The paper by Canada's Hake, Barry, and Boyd has an excellent general treatment of the concept of plant safety on the basis of siting, safety systems, quality control, and operating procedure. An equally good treatment of reactor safety and related topics is covered in the paper "Reactor Safety in the Federal Republic of Germany."

Most of the papers clearly indicate that West European nations and Japan have relied heavily on the U.S. for nuclear plant design criteria, nuclear standards, and results of reactor safety research. In fact, Isberg of Sweden indicated in his paper that the problems experienced at Marviken could have been avoided had the USAEC general design criteria been available to the plant designers. Although most of the light-water reactor safety research and development has been done in the U.S. the Europeans, especially in Sweden, have been innovative in applying and modifying the stringent rules, criteria, and guides of the USAEC. The United States has supplied the "applied" technology, and Europe has provided the "theoretical." Sweden is considering using pipe rupture as the maximum credible accident for accident analysis in non-urban sites and vessel rupture for urban site analysis, a departure from present USAEC philosophy. Another interesting concept—although practiced in the U.S. but not as clearly codified as in Sweden—is the 30-min rule which stipulates that all actions taken within 30 min after an accident to avoid a major catastrophe have to be made automatic. This rule is spelled out in the paper "Containment and Safety in Swedish Nuclear Power Plants."

Two distinct areas of reactor safety are underlined in many of the papers: (a) dissatisfaction with the present method of accident analysis based on maximum probable accident rather than on a probabalistic approach; and (b) concern over reactor vessel technology, specifically as it applies to reactor safety. Both of these topics no doubt will become important in the U.S. in the foreseeable future especially within the present climate of uncertainty in the nuclear industry. The extensive coverage of these two topics alone justifies the reading of Vol. 3 of the Proceedings.

The four U.S. papers are interesting in that they describe the concept of "defense in depth" and provide a final summary of recent U.S. standards work, safety criteria, and AEC philosophy on reactor safety. The articles on "The Role of Codes and Standards in Achieving Safe, Dependable and Economic Nuclear Power," "Regulatory Perspectives and Emphasis, and Safety Experience for Nuclear Power Reactors," and "Technical Safety Issues for Large Nuclear Power Plants," are worth reading because they provide a quick insight into the current U.S. nuclear safety program.

The Proceedings have three papers on gas-cooled reactor safety and two on fast reactor research and development. Of the six papers on the legal aspects of nuclear energy, Shapar's paper is especially interesting because it covers recent U.S. regulations in the field of protection of the environment and nuclear power plants, issues which have only recently attained significance in Europe.

Orest A. Hrynewych (BS, electrical engineering, University of Illinois, 1966; MS, nuclear engineering, University of Illinois, 1967) is a member of the Sargent & Lundy's Nuclear Licensing Division. He has been involved in writing and editing the Preliminary Safety Analysis Report and the Environmental Report for the Wm. H. Zimmer Nuclear Power Station of Cincinnati Gas &

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?