Alar, or daminozine, a farm aid to apple growers which attracted major concern when it was widely publicized. Appendix I discusses Statistics; Appendix II, Mathematics, discusses exponential curves. Four pages of general references follow.

The book has very real value, especially for students who seek a more complete understanding of how chemicals can be properly studied. The accuracy and implications of some statements are questioned. In chemical hazard evaluations, more than one reference source should be cited and used. However, the book is recommended by this reviewer.

H.H. FAWCETT

Low-Level Environmental Radioactivity: Sources and Evaluation, by Richard Tykva and Josef Sabol, Technomic Publishing Co., Inc., Lancaster, PA, 1995, $58.00, 331 pp., ISBN: 1-56676-189-1

One of the major health concerns in certain areas of the United States is exposure to radon. Exposure to that chemical as well as to other naturally occurring radionuclides is by far the largest contributor of the radiation dose received by the human body. Of the 2500 radionuclides known, 80 are found in nature.

Radon comes in for further discussion early in the text, thus illustrating its importance:

"Radon is known to enter the atmosphere mainly by crossing the soil–air interface. There are a number of other secondary sources, such as the ocean, groundwater, natural gas, geothermal fluids, and coal combustion, however, which have also to be taken into considerations. The *outdoor radon concentrations* at ground level are usually governed by the source term, i.e., the exhalation rate, and by atmospheric dilution processes. Both of these factors are affected by the local meteorological conditions, which are also to a large extent responsible for the degree of radioactive equilibrium between radon and its daughters."

A second major source of naturally occurring radiation is cosmic rays

"*Cosmic rays* generate a range of stable nuclides and radionuclides in the atmosphere, biosphere, and lithosphere by a variety of nuclear reactions. In these processes a dominant role is played by high-energy *primary cosmic rays*, although even the secondary particles released in their interactions are still very effective in the creation of *cosmogenic nuclides.*

A third source of radionuclides is man-made.

"The utilization of nuclear energy for the generation of electricity, the applications of radionuclides in industry, technology, science, medicine, and consumer products as well as the tests of nuclear weapons result in the release of various radioactive materials into the environment. Assessment of the actual or potential radiological consequences of such releases of radionuclides into air and water, or their disposal in the ground, is a complex procedure."

"The purpose of this book is to provide an introduction to low-level radioactivity assessment and to clarify the nature of its sources, as well as the principal methods

used in its measurement. Our evaluation is concentrated on the present-day aspects of low-level methodology. The book may be useful for all who need highly sensitive analysis of natural or artificial radioactivity both within and outside the nuclear field.

The attempt of this book is to summarize the sources of environmental radioactivity and their possible radiological impacts in terms of resulting doses to the population, and to present a sound review of the measuring methods and techniques for the evaluation of low-level radioactivities encountered in both the environment and in a number of applications where radioactive sources are used as a means of obtaining important information."

Sandwiched in the middle of the very long (129 pp.) first chapter, entitled "Radionuclides and Radiation Emitted," is an excellent discussion of the radiation emitted by nuclear power plants, fuel cycle, etc. Also discussed are the several nuclear accidents that have occurred during the 50 years of the nuclear industry (the first accident was Canada's NRX reactor; the last was Chernobyl). The release rate and human exposure impact of the Chernobyl accident are discussed in some depth. I was surprised that in spite of its severity, only 410 radiation-induced cancers are expected in the USSR and 55 outside of the country.

Also, the authors discuss the medical uses for radionuclides, which they categorize into three groups: (1) diagnostic evaluation, (2) radiation therapy and (3) nuclear medicine.

"In addition to the nuclear industry and nuclear-related activities and applications, there are some other practices and fields, essentially *non-nuclear*, where radioactive materials are used or unintentionally generated," such as luminescent paints and smoke detectors. Even coal combustion emits significant amounts of radioactivity in the fly ash.

The second (of only three in the book) chapter is entitled "Experimental Arrangements for Low Radioactivities." The main focus of this chapter is on measuring low level activity. The chapter includes a discussion of different types of instruments.

The third (and final) chapter of the text discusses "Selected Fields of Low-Level Radiation." In this chapter the authors briefly present further examples (beyond those discussed in the first chapter) of low-level fields. Discussed are the transport of radionuclides in the environment (air, water and soil), radiochronology (determination of age by means of the measurement of specific activity of radionuclides), activation analysis, whole body counting, field and area monitors, assessment of radon and its decay products.

GARY F. BENNETT

Operation of Spent Fuel Storage Facilities, International Atomic Energy Agency, Vienna, Austria, 1995 (Safety Series No. 117), 240 Austrian Shillings, 54 pp., ISBN: 92-0-105094-1

This Safety Guide was prepared by the IAEA through a series of meetings of technical experts. Their goal was to provide guidance for spent fuel storage to provide