were defined too many different times, which could be enlightening; however, the repetition at times was somewhat difficult to take, being more semantic than substantive. The connection between soil health and plant productivity was not well developed and there was no mention at all of the connection between soil health and human health, which was disappointing. The synthesis of soil quality and soil health is still lacking and this may be because we are trying to understand a complex system, and at this point we possibly cannot comprehend it. Overall, the book is an excellent resource and a compilation of the current status of our knowledge to date. It will be a great source to further our understanding of soil health and preserving our soils as our natural resource.—ANN C. KENNEDY, USDA-ARS, P.O. Box 646421, Pullman, WA 99164-6421 (akennedy@wsu.edu).

The Reuse and Recycling of Contaminated Soil

Remediation of soil contaminated by petroleum and other chemicals has become a major undertaking in developed countries. As technologies to treat chemically contaminated soil emerge and are brought into commercial use, an increasingly important question is what to do with the remediated soil. These materials may still contain residual contaminants or may be in physical and chemical conditions that preclude their direct use as topsoil.

The present text considers several options for reuse of these treated soils. The book is well written and uses case studies to illustrate treatment technologies and reuse possibilities. As someone who teaches in the general area of soil contamination and remediation, I find this text to be an excellent resource and would not hesitate to use it as a primary text.

The first chapter gives an excellent summary of the soil contamination problem with useful U.S. statistics. Chapter 2 reviews the U.S. regulatory framework for hazardous wastes and contaminated soils. Chapter 3 discusses reuse and recycling options for bituminous and nonbituminous containing soils; the bituminous materials are used in asphalt manufacture and the nonbituminous materials are used in cement and brick manufacture. These are structural soil uses and do not involve use of the remediated soil for plant growth. Chapter 5 is an excellent summary of the various extraction tests, such as the TCLP, used to quantify hazardous constituents in soils, and Chapter 6 summarizes standard soil mechanics tests. Chapters 7 and 8 are excellent descriptions of the chemistry of bitumens and asphalt, and Chapter 9 does the same for cementitious products. Chapter 12 provides several case studies of reuse of bituminous remediated soil.

This book will be an excellent text for use in undergraduate or graduate environmental science and engineering courses on soil remediation.—T.J. LOGAN, School of Natural Resources, The Ohio State University, Columbus, OH 43210 (logan.4@ohio-state.edu).

Animal Waste Utilization: Effective Use of Manure as a Soil Resource

This book is the proceedings of a workshop on animal manure utilization held at the National Soil Tilth Laboratory in 1994. The book comprises 10 chapters on the management of animal manures to prevent water quality problems. The chapters are written by some of the most respected researchers in the field and deal with the economics of beneficial use of manure, best management practices for manure utilization, impacts of animal manure management on water quality, and a systems engineering approach to manure utilization.

This is a very timely text in light of current national concerns about the effects of animal manures on water quality and other health and environmental impacts. What is striking about the content, however, is how little new knowledge and technology have been developed on the subject of manure management. This point was well developed in the first chapter by Nowak, Shepard, and Madison, who concluded that although the value of manure as a soil amendment has been known for centuries, modern farmers are still not rationally integrating manure into their farm production systems. Their paper had no references more recent than 1993. The same is the case for the paper by Forester on economic issues, whose conclusions are no different today than they were two decades ago when he was writing on the same topic: in the absence of regulatory or economic incentives to more efficiently manage manures, today's farmers will not do so. The long lead time in getting this book out (1994–1998) has left some of the chapters guessing at the impacts of a rapidly changing animal production agriculture. This is seen in the chapter by Brumm on swine manure where he speculates on the effects of the changing swine industry in the USA on swine manure characteristics, yet these changes are now in full swing in states like North Carolina and Iowa. The chapter by Bouldin and Klausner on nitrogen dynamics in dairy manure in New York points out the difficulty in predicting and managing the nitrogen cycle and predicts that farmers will have to manage manure nitrogen more carefully in the future. The chapter by Moore on poultry manure is well written and summarizes much of the work done by the author on chemical (primarily alum) treatment of poultry manure to reduce ammonia volatilization and immobilize P and trace elements. There is also evidence for some reduction in fecal coliforms with alum. Sweeten’s chapter on cattle feedlot manure management is a good review of the science and practice in this area, but the coverage is traditional and little in the way of innovation is presented. Sharpley provides an excellent review of water quality impacts of manure application to land, and shows how individual states and European countries are attempting to regulate manure utilization. He concludes, as does Forster, that there has been little implementation of the large knowledge base developed over the last 30 years on effective manure management. Day and Funk discuss methods for the processing of manure. The methods described are very traditional and this chapter was the most disappointing in its lack of innovation. As several of the other authors have indicated, processing of surplus manure for off-farm use may be the only viable solution for areas with large confined animal operations, and I was hoping for more from this chapter. It suggests that the animal industry has yet to utilize the innovations and technology developed in the municipal wastewater industry as a consequence of the large public investments in wastewater treatment infrastructure in the 1970s and 1980s. The last chapter, by Karlen, Russell, and Mallarino, on a systems approach to manure management, lays out the framework that the animal industry must adopt if it wishes to convince the public that it has the technical sophistication and will to responsibly manage its production wastes.

The topic of this text is extremely important in light of present realities in the animal industry and it represents state-of-knowledge circa 1994. Unfortunately, the delay in getting the book out has diminished its value because of the significant changes in the industry since then.—T.J. LOGAN, School of Natural Resources, The Ohio State University, Columbus, OH 43210 (logan.4@ohio-state.edu).