Quantitative Environmental Risk Analysis for Human Health


This is a comprehensive text/reference book focusing on the environmental risks to human health. Quantitative environmental risk analyses for both chemical and radioactive contaminants are presented in this book. There are fifteen chapters and two appendices. Following each chapter, the references cited in that chapter are listed along with a series of problems related to the concepts presented. While the book is not divided into sections, three general concepts are discussed. After the introductory chapter, modeling and transport are described in chapters 2 through 8. The remainder of the book (chapters 9 through 15) focuses on the human aspects of exposure, toxicology, risk, and regulations. As the authors state in the preface, certain chapters can be omitted or emphasized depending on the orientation of the course. For science-engineering oriented classes, the environmental transport chapters (5 through 8) should be emphasized. For environmental risk analysis classes, chapters 13, 14, and 15 are essential.

Chapter 1 is the introductory section, which provides the vision for the book. The three components of risk analysis are presented as a diagram in Fig. 1.1. While risk management and risk communication are briefly discussed, this chapter is devoted mostly to risk assessment. The environmental risk assessment process is described as a flow chart with sections of the text devoted to the process components. The modeling and transport section begins with chapter 2 describing the fundamental aspects of environmental modeling. The modeling process section is divided into model development, modeling assurance, and modeling phase sections. In the section on physical and mathematical basis for risk assessment models, numerous models replete with examples are presented. Chapter 3 discusses release assessment and chapter 4 details environmental transport theory. Chapters 5, 6, and 7 detail surface water, ground-water, and atmospheric transport, respectively. Each chapter follows the format of an introduction followed by description of the various media, contaminate sorption, and media-specific modeling. These three chapters would probably be of most interest to readers of the Journal of Environmental Quality. Food-chain transport is described in chapter 8. Low level contaminations in soil/water/air are bioconcentrated as they progress up the food chain. I found the parenthetical inclusions of the "(a)," "(c)," "(s)," "(v)," and "(w)" in the figures, examples, and sentences of chapter 8 to be confusing. These inclusions, however, were neither defined nor consistently applied throughout the chapter.

The human aspects of the exposure, toxicology, risk, and regulations section begins with chapter 9. Exposure assessment, chemical dose, and radiological dose are described in chapter 9 before contaminant intake. The intake methods of inhalation, ingestion, and dermal absorption are discussed with examples. I was surprised that the inhalation of dusts, molds, and allergens was not mentioned. Chapter 10 discusses basic human toxicology with major organ systems described. Chapter 11 discusses dose–response and risk characterization. Chapter 12 connects the quantitative, scientific-engineering material discussed previously to the qualitative, stakeholder-regulatory chapters that follow. Stakeholder involvement and risk communication are discussed in chapter 13, with environmental risk management in chapter 14 and legislation in chapter 15.

In summary, this broad-spectrum book is well written and useful to both academic and professional audiences. This would be a good reference book for physical scientists wishing to become more involved in human-health studies. As the title of the book suggests, there is an ever growing need to quantify environmental risk as related to human health.

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