- Risk Assessment Paradigms
- Conducting the Hazard Identification
- Analytical Methods for Developing Occurrence and Exposure Databases
- Exposure Assessment
- Conducting the Dose–Response Assessment
- Conducting the Risk Characterization
- Compendium of Data

One of the longest (100 pages) and most mathematical chapters is the one on exposure assessment. The authors, in great detail, mathematically (and statistically) discuss exposure assessment and, at the end, include problems to be worked [as an aside, if exercises, both mathematical- and discussion-type had been included in prior chapters also, the book's use as a text would be enhanced].

Chapter seven, entitled ''Considering the Dose Response Assessment,'' follows the same path as its preceding chapter — mathematically based and followed by problems for the reader (student). I suspect both chapters were written by the same author. The objective of dose-response, according to the writer, is to develop a relationship between the level of microbial exposure the likelihood of occurrences of an adverse response. To this end, dose-report models are discussed (in detail).

Building on the preceding chapter, the book goes on in Chapter 8 to the topic of ''Conducting the Risk Characterization'' which ''integrates the results of (dose response and exposure assessment) into a risk statement that indicates one or more quantitative estimates of risk.''

The book, by topic, may appear to be outside the sphere of interest of the *Journal of Hazardous Materials*, but that's not so. There are no more hazardous materials than microbes and waste treatment (a key area covered by *JHM*) is a primary source (and utilization) of microbes. Hence the relevance.

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Basics of Industrial Hygiene. Debra K. Nims, Wiley, New York, NY, 1999. 355 pp., ISBN: 0-471-29983-9

The author is adjunct Professor at the University of Idaho and runs her own environmental health consultancy. This book is set out in a format of objectives, text, summaries and critical thinking questions. It is intended for environmental technology students. It covers a very wide range, from physiology through chemical and physical agents to ergonomics, and nearly all are clear, friendly and easy to understand. The text is a little uneven in style, and there may be more contributors than the ones acknowledged in the preface. The chapters deal with Introduction to Industrial Hygiene, Toxicology, Occupational Health Standards, Airborne Hazards, Sampling for Airborne Contaminants, Indoor Air Quality, Controlling Airborne Hazards, Occupational Skin Disorders, Occupational Noise Exposure, Ionizing and Non-ionizing Radiation, Ergonomics and Temperature Extremes, and Selection and Use of PPE. The legal and professional content is entirely American.

The abstract in Chapter 5-8 on AIHA and NIOSH strategy manuals is helpful, with a brief review of BEIs and TLVs. The Glossary and Index are extremely useful in locating first mention and other important mentions of a term.

The illustrations are numerous, but sometimes repetitive. This is especially true in the early chapters, where there are three very similar illustrations (2-5, 4-1 and 4-2) of all or parts of the respiratory tract, or in Chapter 2-6 where two tables with very similar information about nervous system effects are not supported by a diagram of the nervous system indicating what the terms mean. Figure 2-6 is more useful than Figure 8-2 to illustrate Chapter 8 on the structures of the skin. There are two charts of the electromagnetic spectrum (5-24 and 10-1) which are different (reversing left and right, using a different base unit for wavelength, etc.) and therefore unhelpful and they are NOT cross-referred. Many of the illustrations are full of useful information. Sometimes, they do not match the text: 5-18 is part of one device, not ''some electronic calibration devices'', and Table 4-1 has the word edema, which is not defined in the glossary nor in the index.

Chapters 9–12 on noise, ionizing and non-ionizing radiation, ergonomics and temperature, and selection and use of personal protective equipment, most of which also summarise US legal rules, are very full and helpful. The chapter on temperature and heat stress makes many valuable points. Noise is helpfully cross-referred (Chapter 12, Chapter 9 and Appendix 5). Chapter 3 on noise is not cross-referred to Chapter 9, although both refer to the OSHA rules and 29 CFR 1910.95. Chapter 12 is generally not cross-referred to earlier Chapters containing some of the same material (examples: the PPE selection charts for eye protection at 10-6 and at 12-1, permeation testing in Chapters 8-4 and in 12-2), nor are discrepancies explained. It would have been instructive to remind the reader of the difference between an OSHA standard and an ANSI standard. There is an excellent index to 29 CFR 1910 (Occupational Safety and Health Standards) and 1926 (Construction Standards) in the Appendices.

I suspect that the author is happier with physiology and health than with chemistry and physics. The figure of infrared spectra of ''common industrial solvents'' 5-26 includes two (carbon tetrachloride and 1,1,1-trichloroethane, wrongly titled 1,1,1-trichloroethylene), one of which is carcinogenic, ozone-depleting, and rarely used, the other is being phased out world-wide because of its ozone-depleting properties. The equation for dilution ventilation in 7.4 is correct, but the explanation in the text is wrong: 387 is the volume of air (or any gas) containing the molecular weight in pounds of the gas, not the volume of 1 lb of air. In Chapter 5-6, p. 122, there is confusion between titration, where the amount of reagent to an end point is the factor measured, and colorimetry, where a standard amount (excess) of reagent is added, and the intensity of colour is measured. Gas chromatography gases are not necessarily inert (p. 122), indeed, hydrogen is a common carrier gas ingredient where the detection is by flame ionization detector: the author means ''unreactive to the sample chemicals''. PID and FID detectors are discussed on pp. 135–136, but not other detectors such as electron capture.

The calculation of 8-h TWA at p. 56 is wrong, in that the denominator of 8 is not the total time of exposure, it is the factor required to convert the measured time-weighted average over a day to a common reference 8-h day. The denominator should be the total of the time periods (sum of $T_1 \ldots T_n$) for which concentrations were measured. This is

converted to an estimate of the average exposure during the actual working day by judgement whether the exposure during periods not measured would have been the same as one of the measurements, or zero (e.g., periods out of the workplace) or about the same as the average. Then, the estimated average for the whole working day of H h is converted to a reference 8-h time-weighted average by multiplying by $H/8$. The error is apparent as soon as you choose an example where the sampling periods do not add up to the full work day, or to 8 h. Unfortunately, official guidance on both sides of the Atlantic is confused on this issue.

Numbers and consistency in general have not been thoroughly checked in this book. Paracelsus died in 1591 on p. 4 or in 1541 on p. 21. The British 1833 Act was an act to protect the sanitation, morals and education of apprentices in textile mills (p. 50), not a workmen's compensation act (p. 4). The corresponding F temperature to 36°C is wrong in the text on p. 255, but right in the adjacent table. The discussion in 4-4 (p. 83) of the vacated OSHA PEL for silica is clear and brief, with a throwaway remark that the constant 2 added to the denominator is there to limit the concentration of respirable dusts with less than 1% SiO_2 to 5 mg/m^3. Because the adjacent table is wrong, the enquiring reader will calculate that the limit actually reduces to 5 mg/m^3 for respirable quartz, and to 2.5 for respirable tridymite or cristobalite.

Given the large amount of useful information packed into this text, it seems churlish to comment on the errors: but there are enough to cause confusion and throw slight doubt on other materials.

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The Complete Guide to Hazardous Waste Regulations RCRA, TSCA, HMTA, OSHA, and Superfund, Travis P. Wagner, John Wiley and Sons, New York, NY, 3rd edn., 1999, US$69.95, 536 pp., ISBN: 0-471-29248-6

US Environmental law are complex. RCRA (the Resource Conservation and Recovery Act) is exceedingly complex (the author notes it is ''frustratingly complex''). Thus, the need for a book (or books) explaining the requirements of the law but more imperatively guiding one to compliance with its multitude of provisions.

To illustrate my point regarding the law's complexity (and attendant voluminous regulations resulting from it), let me quote from the section on Recycling Hazardous Wastes:

''It is intuitively understood that the legitimate reuse, recycling, and reclamation of hazardous waste is far more beneficial than treatment and/or disposal. However, recycling activities also have environmental and public health impacts. In fact, many of the early Superfund sites were former recycling facilities. Thus, EPA has been faced with a major challenge: promoting the reuse, recycling, and reclamation of hazardous waste while ensuring that it is done in a manner protective of human health and the