notes: “To study various laws and regulations affecting the practice of engineering and engineering projects, the case study method as normally employed in American law schools is used in this text. The case study method examines how the law in a litigated action with a particular issue, or issues, is argued, interpreted and applied by the hearing court or hearing board in the case of a regulatory agency review. Environmental case studies generally review the environmental issue being litigated from its inception at the agency level, to hearing board appeals, and through the appeal to the trial court. From the case study, the purpose and parameters of a regulation at issue are examined, defines, and construed by the court for implementation as intended by the enacting legislative body. Case studies offer the opportunity to learn from misinterpretations, mistakes and challenges of others, and to know what is expected in performance to comply with environmental regulations and laws.”

The case studies noted above are listed in the ‘Table of Contents’ which I estimate spans 240 cases (Aston actually discusses about 100 of those court cases), one of which I testified in. The case list is certainly up to date as one case litigated in 2001 is cited.

Major sections in the second chapter on basic law are: (1) Divisions of law which includes an overview of the American legal system, a description of the Federal court system and state courts, a discourse on statutory law/administrative law, and agency rule making; (2) General requirements for filing a civil court action; and (3) Briefs (case reports, finding the case style and citation of cases, and explanation of citations).

Next, Aston discusses the basics of three major US environmental laws: National Environmental Policy Act (NEPA), Clean Air Act (CAA), and Clean Water Act (CWA). Chapters 3–5 are devoted to the foregoing. Other important laws are discussed in Chapter 6: Toxic Substances Control Act (TOSCA), Resource Conservation Recovery Act (RCRA), and Comprehensive Environmental Response, Compensation and Liability Act (CERCLA).

Chapter 7, “Water pollution by abandoned mine sites; acid mine drainage; mined land restoration,” reflects the author’s roots in mining engineering. The relation (and use) of CERCLA, Superfund Act Reauthorization Amendments (SARA) and CWA to address the above noted problem is discussed. The task is not inconsequential as there are 550,000 abandoned sites of which 50 are on the Superfund hazardous site list.

Being an engineer whose major contact with the law has been as an expert witness, I cannot comment on the quality of the legal material presented. But I very much would have liked to have had the opportunity of taking a course of this title, especially if taught by the author.

G.F. Bennett

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Combustion and Incineration Processes

Walter R. Niessen (Ed.), Marcel Decker, New York, 3rd Edition, 2002, 696 pp., US$ 195.00, ISBN: 0-8247-0629-3

In the preface to his first edition of this book, which focused on incineration of municipal solid waste, Niessen wrote: “Purification by fire is an ancient concept, its applications noted in the earliest chapters of recorded history. The art and technology of combustion

(incineration) and pyrolysis as applied to environmental engineering problem draws on this experience, as well as the results of sophisticated contemporary research. To many engineers, however, combustion systems still hold an unnecessary mystery, pose unnecessary questions, and generate unnecessary mental barriers to their full exploitation as tools to solve tough problems. This book was written in an earnest attempt to thin the clouds of mystery, answer many of the questions (those for which answers are available), and to provide a clearer way for the engineer to analyze, evaluate, and design solutions to environmental problems based on combustion."

In the preface to the second edition 15 years later, Niessen notes: "The application of incineration to the hazardous waste area has required new levels of process control and better and more reliable combustion performance. There is now a profound and pervasive impact of state and federal environmental regulations and guidelines on design and operation. Consequently, air pollutant emission issues have assumed a dominant position in shaping configuration and cost."

This, the third edition, was modified to include the new and extensive requirements of air pollution control as well as addressing hazardous waste site remediation. In the preface, Niessen writes: "... the scope has been expanded to include: (1) additional details and graphics regarding the design and operational characteristics of municipal waste incineration systems and numerous refinements in air pollution control, (2) the emerging alternatives using refuse gasification technology, (3) lower-temperature thermal processing applied to soil remediation, and (4) plasma technologies applied to hazardous waste."

The book has 15 chapters and seven short appendices. By title, the chapters are:

1. Introduction
2. Stoichiometry
3. Selected topics on combustion processes
4. Waste characterization
5. Combustion system enclosures and heat recovery
6. Fluid flow considerations in incinerator applications
7. Materials preparation and handling
8. Incineration systems for municipal solid wastes
9. Incineration systems for sludge wastes
10. Incineration systems for liquid and gaseous wastes
11. Incineration systems for hazardous wastes
12. Other incineration systems for solid wastes
13. Air pollution aspects of incineration processes
14. Air pollution control for incineration systems
15. Approaches to incinerator selection and design

One will note in the list of chapters an emphasis on air pollution control. Air pollution concerns have greatly impacted incinerator location and design. NIMBY (not in my back yard) concerns are based mainly on apprehension of the impacts of air contaminants in incinerator air emissions. Paramount among the concerns is the potential impact of heavy metals and the dreaded "dioxins". This concern is evidenced in the book by the following statement in the preface. "Chapters 13 and 14 of this book, most importantly, give testimony to the great

concern that has been expressed about air emissions from metal waste combustion (MWC). This concern has often involved strong adversarial response by individuals in potential host communities that slowed or ultimately blocked the installation of new facilities and greatly expanded the required depth of analysis and intensified regulatory agency scrutiny of the air permitting process. Further, the concern manifested itself in more stringent air emission regulations that drove system designers to incorporate costly process control features and to install elaborate and expensive trains of back-end air pollution control equipment."

Given my dual interest in waste combustion and air pollution control, I examined Chapter 13 with great interest. To say the least, that chapter was comprehensive and up-to-date. Discussed are recent concerns for emissions of small particles (denoted as PM 2.5, the respirable fraction of particles less than 2.5 μm in mass mean diameter) and the products of incomplete combustion such as benzene-soluble organics, polyhalogenatedhydrocarbons (PHH) and *p*-dibenzo dioxins (PCDD) and biphenyls (PCB, PBB). The potential emissions of more mundane pollutants such as HCl, NO_x, and SO_x also are discussed.

This chapter on potential emissions is followed by one on control systems. This 60-page chapter is comprehensive, beginning with a discussion of mundane settling chambers and all types of control devices up to specialized abatement technology for NO_x control. I was impressed by the scope and depth of the discussion.

Speaking of depth, the 551 references found at the end of the book attest to the author's familiarization of the literature.

I was amazed at a discussion of a "slagging system for biological sludge" (page 406, Chapter 9). Recently, I was involved in review of such a system designed for sewage sludge disposal at a nearby city. I had never heard of the process before and thought it was unique. Not so unknown to me were the citations in the book of the Kubota and the Itohtakuma systems that produce a non-leaching sludge ash by heating the sewage sludge beyond the point of fusion to produce a glassy slag. To me, discussion of these processes is more evidence (if needed) of Niessen's comprehensive treatment of the topic.

The book includes a floppy disk (a modern addition to texts) that contains "Spreadsheet Templates for Use and Material Balance Calculations". Seven spreadsheet files, a three-file group that installs an executable program with associated support files, and a text file are in this supplied program. The use of the program is described in Appendix F. The spreadsheet can be used to calculate heat and material balances, heat of combustion, moisture correction in refuse analysis, equilibrium constant estimation, and steam properties.

Finally, I note that in many cases Niessen includes numerous worked examples of the equations he presents, thus avoiding my common criticism of the lack of such material. In summary, I must confess this short review does not do the book justice. It is well-written and comprehensive. I strongly recommend it for any course in incineration or for anyone working in the field.

G.F. Bennett

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